GLOBAL ENVIRONMENTAL REGULATION AND WORKERS IN THE SHIPPING INDUSTRY

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DEDICATION

In loving memory of my sister *Sisu Ngeche*, April 1976 - April 2010

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ABSTRACT

This thesis explores the practice of complying with environmental regulations in the global shipping industry and examines the impact on workers. Using a case study example of a large and reputable ship management company, I discuss the understandings that onshore and sea-going staff at the company have of policies and practices in relation to environmental protection. The case study approach used here involves ethnographic fieldwork aboard two container ships and at the company premises. Three research techniques are employed: semi-structured interviews, observations and documentary analysis. Specifically, and based on the operation of five key components of the company's environmental programmes on board the ship: garbage; sewage; ballast water; oily wastes; and atmospheric emissions, the research examines seafarers' practices of implementing the programmes and whether ship staff and their shore-based managers perceive the practices as damaging.

Two significant findings emerge: that while environmental compliance has increased the workload on board, ship staff do not consider this change to affect the quality of their work and life on board the ship; and that seafarers are more likely to suffer from stress when complying with environmental regulations but are disinclined to worry about the potential for occupational exposures. The study also found a correlation in the understandings of both managers and seafarers at the company about the relevance of environmental requirements in general and of the company environmental management system in particular, which played a critical role in terms of how these requirements were operationalized aboard the ship.

This study contributes to current understandings of the practice and impact of corporate compliance with environmental regulations.

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LIST OF ACRONYMS AND ABBREVIATIONS

AB	Able Seaman
AGCS	Allianz Global Corporate & Specialty
ATLAS.ti	Qualitative Data Analysis & Research Software
ATSDR	Agency for Toxic Substances and Disease Registry
BIMCO	Baltic and International Maritime Council (BIMCO)
BMT	BMT Murray Fenton Edon Liddiard Vince Limited
BSA	British Sociological Association
CAQDAS	Computer Aided Qualitative Data Analysis Software
Caribbean MoU (CMOU)	Caribbean Memorandum of Understanding on Port State Control
CBT	Computer-Based Training
CDC	Centers for Disease Control and Prevention
CDI	Chemical Distribution Institute
CEDRE	Centre of Documentation, Research and Experimentation on Accidental Water Pollution
CFC	Chlorofluorocarbon
DPA	Designated Person Ashore
dwt	Deadweight tonnage
EC	European Communities
ECA	Emission Control Area
EMS	Environmental Management System
EMS-01	Ship Monthly Environmental Report
EMSA	European Maritime Safety Agency
EPA	United States Environmental Protection Agency
EQUASIS	European Quality Shipping Information System
EU	European Union
FAC	First Aid Cases
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
GHG	Greenhouse Gas
GT	Gross Tonnage

HFO	Heavy Fuel Oil
HNS	Hazardous and Noxious Substances
IACS	International Association of Classification Societies
IAPP Certificate	International Air Pollution Prevention Certificate
IARC	International Agency for Research on Cancer
ILO	International Labour Organization
IMO	International Maritime Organization
IOPP Certificate	International Oil Pollution Prevention (IOPP) Certificate
ISF	International Shipping Federation
ISM Code	International Safety Management Code
ISO	International Organization for Standardization
ISPS	International Ship and Port Facility Security
ITOPF	International Tanker Owners Pollution Federation
kWh	Kilowatt hour
LPSQ	Loss Prevention, Safety and Quality
LSFO	Low Sulphur Fuel Oil
MAIB	UK Marine Accident Investigation Branch
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	UK Maritime and Coastguard Agency
MEPC	Marine Environment Protection Committee
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
NIR	New Inspection Regime
NOx	Nitrogen Oxide
OCIMF	Oil Companies International Marine Forum
OECD	Organisation for Economic Co-operation and Development
OHS	Occupational Health and Safety
OS	Ordinary Seaman
OSHA	US Occupational Safety and Health Administration
P&I Clubs	Protection and Indemnity Clubs
Paris MoU (PMOU)	The Paris Memorandum of Understanding on Port State Control
PCB	Polychlorinated Biphenyl

PDOS	Pre-Departure Orientation Seminar
PPE	Personal Protective Equipment
PSC	Port State Control
QMS	Quality Management System
QUALITI	Qualitative Research Methods in the Social Sciences
rpm	Revolutions per minute
SECA	Sulphur Emission Control Area
SGMP	Ship Garbage Management Plan
SIRC	Seafarers International Research Centre
SIRE	Ship Inspection Report
SMEP	Shipboard Marine Pollution Emergency Plan
SMS	Safety Management System
SOCSI	Cardiff University School of Social Sciences
SOPEP	Shipboard Oil Pollution Emergency Plan
SOx	Sulphur Oxide
SRA	Social Research Association
SSI	Sustainable Shipping Initiative
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
TEU	Twenty-foot equivalent unit
TMSA	Tanker Management Self-Assessment
Tokyo MoU	Tokyo Memorandum of Understanding on Port State Control
TRC	Total Recordable Cases
UK	United Kingdom
UNCLOS	United Nations Convention on the Law of the Sea
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USCG	United States Coast Guard
VOC	Volatile Organic Compound
WHO	World Health Organization

INTRODUCTION

This thesis is about the impact of corporate environmental compliance strategies on sea-based workers' roles and wellbeing. The study explores the everyday practice of complying with environmental protection requirements in the merchant shipping industry. Specifically, the research examines the understandings of both shipboard workers and their shore-based managers about the operation of company environmental programmes aboard the ship, and the impact of these upon seafarers' wellbeing.

Merchant ships operate in oceans worldwide regularly entering coastal waters and, in some cases, inland waters such as in river ports. The normal operation of these ships produces a variety of costs to society, including environmental and health impacts. For example, shipping emissions have been linked to adverse health impacts, including asthma, lung cancer, cardiovascular diseases, and premature mortality (Corbett et al. 2007). Because people tend to work and live on board ships for very long periods, usually from a few weeks to several months, these workplaces have the potential to generate wastes similar in volume and character to those generated by land-based industries. A familiar example may be found in cruise ships. The provision of amenities similar to those of hotels, to thousands of passengers and crew on board cruise ships suggests an even greater capacity for a vast number of waste streams (see US Environmental Protection Agency 2008). However, not all merchant ships are the same and in terms of the number of people on board there is no similarity between cruise and cargo vessels. Bigger ships generally carry more crew on board[1] (see Winchester et al. 2006). Notwithstanding the smaller number of people on board, the operation of some ship types might have additional environmental impacts. For example, chemical and oil product tankers tend to pose higher risks of pollution from spills. These ships also have the potential for releasing volatile organic compounds from their cargoes.

This research derives from both widespread public awareness and concern about the polluting activities of shipping and from the industry's own recognition of the scale and incidence of ship-source pollution (see, for example, GESAMP 1990; see also IMO 2009[b]). The growing global pressure about environmental sustainability and the call for industries

[1] Even though bigger ships are certified to carry more persons, cargo ships have been reducing the size of their crews with increased automation (average crew size is currently 20).

to adopt the idea as part of their business strategy is far from restricted to land-side sectors. This pressure is also being felt in the shipping industry (see, for example, Meade 2011) which has recently distinguished itself as a sector that is looking ahead, by developing a business case for sustainability in shipping[2]. As more land-based industries yield to pressures to take on environmental sustainability, so too will their supply chains come under increased scrutiny (see Green et al. 1998).

Shipping may be taking its place in the global green initiative spotlight for the first time but environmental protection is not new to this industry at all. For many years now, commercial shipping has been subjected to increasingly tight regulation motivated by the desire to reduce its environmental impact. International policy has played an important role in this regard as demonstrated by global measures to mitigate various forms of marine and atmospheric pollution from ships. The International Convention for the Prevention of Pollution from Ships, also known as MARPOL, is the oldest and the most comprehensive international treaty instrument that addresses pollution from ships, covering oil; noxious liquid substances carried in bulk; harmful substances carried by sea in packaged form; sewage; garbage; and atmospheric emissions (IMO 2012). However, unlike in land-based sectors, the remoteness of ships as regulated entities has been a major obstacle to enforcing pollution regulations. Ships spend a significant part of their useful life at sea and often away from the countries which have jurisdiction over them. Another difficulty is the structure of the shipping industry itself, where the place of ownership, registration and conduct of business are often unavoidably different and therefore make it difficult to enforce uniform standards.

In spite of these difficulties, regulatory controls have been largely successful at driving environmental compliance on board the ship. The reason for this, as some studies have argued (DeSombre 2006; Barrows 2009), is because of an additional regulatory mechanism within the shipping industry which gives those nation states in whose jurisdiction ships are trading, the right to apply relevant laws and to impose sanctions for any act of infringement. As I will argue in the literature, the practice of subjecting ships to regulatory inspections when in foreign ports – also known as port state control – has been relatively successful at raising global environmental standards and especially because many countries have imposed additional and often more stringent requirements.

[2] The Sustainable Shipping Initiative's (SSI) Case for Action white paper is available from http://www.forumforthefuture.org/sites/default/files/project/downloads/ssifullreport.pdf

Environmental requirements in the maritime industry have become more strictly enforced over time and shipping companies have been receptive to the idea of a greener industry and have in many cases been generally compliant. The last decade has seen considerable improvements in vessel compliance with the standards established by international conventions. The global average port state control detention rate decreased from 8.64 per cent in 2002 to 5.31 per cent in 2009 and there was only a small increase in the number of ships found to be non-compliant (IMO 2012). The safety, security and environmental performance of ships calling at both United States and European ports in the last three years also support the argument that there is an overall improvement in regulatory compliance (see USCG and Paris MoU annual reports[3]).

However, a different picture emerges at the unit level of the industry. Until recently, the shipping industry has been fraught with cases of wilful infringement of pollution prevention regulations. During 2003–2005 alone, US Coastguard prosecutions for vessel pollution and related maritime offences raised over US$ 12.2 million in penalties and handed down probation sentences equivalent to about 20 years in total (Gilmour 2005, p. 4). Violations in the shipping industry are reported to be common with oil pollution prevention practices on ships (see, for example, US Department of Justice 2005; see also BIMCO 2006) but there have been infringements in other areas too. Examples are: falsifying records such as the ship's garbage log book; introducing non-indigenous species into the marine environment during ballast water exchange; and by-passing the ship's sewage system to dump raw waste overboard.

In the light of stricter global requirements, a major concern has been the implication of individual ship staff in contraventions of environmental compliance procedures. Cases have been disclosed extensively in industry print media (see, for example, Eason and McLaughlin 2009; see also Joshi 2009). Industry practitioners have denounced the application of criminal sanctions for infringements in some jurisdictions, in particular the United States, as excessive and damaging for seafarers (Mitropoulos 2004; Jefferies 2006; Mukherjee 2006). Various reasons have been advanced for the infringement of environmental regulations (see Olsen 2005[a]; Abou-Elkawam 2011). However, the evidence is not strong. Seafarers have often blamed acts of violation on their shore-based managers who, in turn, have denied shifting corporate responsibility for compliance to their sea-based staff or even ordering them to dispose wastes illegally at sea.

[3] For improvements in the safety and security performance of ships calling at US and European ports, refer to USCG 2010; USCG 2011; Paris MoU 2009[b]; and Paris MoU 2010.

Just as there is little understanding, to date, of why deliberate acts of pollution at sea continue, so too is little known about the work experience of ship staff fulfilling pollution prevention requirements at sea. The difficulties with environmental compliance and the issues surrounding it have generated considerable interest but only a small number of academic studies have been conducted in this area. One such study (Bloor et al. 2011), used observations of ship inspections in selected Northern European ports (UK and Sweden) and interviews with regulatory authorities and shipping industry stakeholders to assess the effectiveness of regulatory enforcement in Emission Control Areas (ECA). Whereas the research highlighted a number of significant organizational difficulties with compliance at the shipboard level (e.g. off spec fuel supplies, fuel availability and ship design), its purpose was not to provide a deeper understanding of the underlying circumstances surrounding seafarers' operation of environmental requirements on board the ship.

An earlier study (US Environmental Protection Agency 2008), in response to pressure from environmental groups, conducted an in-depth assessment of pollution from cruise ships. The study successfully reviewed the management of major waste streams from ships but its emphasis was on the ecological impact of these waste streams and the regulatory enforcement mechanisms for addressing them. However, the report did not present an assessment of a number of important discharges associated with the normal operation of ships (e.g. ballast water and atmospheric emissions). It was not part of the Agency's remit either to solicit the perceptions of cruise ship workers about the practicalities of environmental compliance programmes used by cruise ship operators.

A review of the relevant literature in other sectors indicates that very little research has been conducted investigating the impact of environmental compliance upon workers' roles and wellbeing. However, in one epidemiological study the exposure of oil pollution response workers to health hazards was conducted in an attempt to generate hypotheses regarding symptoms potentially related to work activities (King and Gibbins 2011) with some success. Research concerned with health impacts from managing solid wastes (Malmros et al. 1992; Poulsen et al. 1995) and from waste water treatment (Friis et al. 1993; Albatanony and El-Shafie 2011) has been conducted making an important contribution to this area. In each of these studies, performing pollution reduction and recycling activities was reported to present a variety of health hazards for workers. While the health and work-related impacts of environmental management has been examined,

the effects are unknown in workers who perform the associated tasks occasionally. The current study is an attempt to explore whether and how workers who are not carrying out pollution prevention activities as specialists think that they might be affected. Thus, the example of the shipping industry simultaneously affords an opportunity to study waste workers who are not engaged in the activity continuously, and also to explore their perceptions about a variety of environmental management activities occurring within a single setting.

A systematic and comprehensive account of ship pollution prevention practices is relevant for regulatory agencies enforcing public policy on the environment, and for port authorities contemplating the application of incentive schemes to address marine and atmospheric pollution. Practical difficulties in some areas, such as with the control of sulphur emissions, suggest that non-compliance may sometimes occur inadvertently. There may also be issues relating to welfare in the workplace which will only become apparent when the views and opinions of workers in the shipping industry have been solicited.

Against this background, this thesis will address the following research question: "In which ways have global environmental standards affected workers in the shipping industry?" Additionally it will consider how shipping companies have responded to global environmental regulation and the impact of environmental compliance programmes on seafarers. To examine these questions, this research will focus on the understandings that onshore and sea-based staff have about the operation of the environmental compliance strategies implemented by shipping companies. It will further consider how such procedures might impact upon seafarers' roles and wellbeing. My aim is to advance current understandings of the practice of complying with environmental regulations in the maritime industry and also to make an intellectual contribution to this largely under-researched area.

To answer the research question, a large and reputable ship management company was used as a case study to illustrate the practice from the perspective of an organization that is trying to comply with the regulations. The research approach adopted here involves the collection and analysis of data using a combination of research methods, including interviews, shipboard observations and documentary analysis. The selected participants are seafarers and their shore-based managers who are involved in the technical and commercial management and operation of ships. The example of the shipping industry used in this study has certain advantages. The shipping industry is a good case to study

among other global industries (e.g. financial and aviation) experiencing changes associated with economic globalization (see also Alderton et al. 2004) because its comprehensive governance structure presents a "critical case" (Goldthorpe et al. 1968; Sampson and Bloor 2007) of regulatory compliance issues. Shipping is arguably an excellent example of a globalized industry which has continually sought to address compliance issues and to improve practices in relation to environmental, health and safety, and labour standards (see IMO 2012). The comprehensive nature of the regulatory framework in shipping can be seen in the implementation of multilateral sanctions and standards regimes by the International Maritime Organization (IMO), and their enforcement at the national level. Nevertheless, within such a comprehensive governance structure, there are a complex set of commercial and regulatory relationships which make compliance particularly challenging in relation to the shipping industry (see also Bloor et al. 2013[a]). Organizational factors such as ownership, management and trading patterns of ships, and their liability to change quickly can result in a complex set of business relationships or supply chains through which regulatory avoidance becomes possible (see also Sampson and Bloor 2007; Clark et al. 2012). As such, studying compliance practices using the case of the shipping industry enables us to better understand regulatory compliance issues that other globalized industries may well be experiencing.

Specifically, this research examines the operation of company environmental programmes in the container sector of the shipping industry. Ocean-going ships spend about 100 days each in port during a year. Of these, container (and cruise and reefer) ships are among the most frequent visitors and arguably the ships which have the most repeated interaction with a broad mix of regulatory systems both locally and internationally.

This thesis is organized into eight main chapters. Chapter one presents the literature review. The chapter considers the governance structure for environmental compliance in the shipping industry and further examines what is known about the impact on sea-going workers of carrying out environmental protection-related activities. Arguing that global regulation has been problematic but nevertheless successful in raising standards with respect to environmental issues, the discussion in this chapter highlights the role of state institutions in enforcing global rules, and the importance of the supply chain influences and the commercial relationships that exist between shipping organizations in driving compliance in the industry. Drawing on the evidence in land-based sectors, the chapter ponders whether sea-going workers carrying out environmental protection-related

tasks could be confronted with the psychological stress and occupational hazards which their land-based counterparts are exposed to, and whether they might be affected in other ways.

Chapter two is the first of two methodology chapters. The chapter explains and justifies the research design used in this study, and provides a brief description of the main techniques employed in conducting the fieldwork. The final part of the chapter focuses on my experience of doing a pilot for this research and discusses how it informed the main study.

Chapter three is a more reflexive account of my field experience. I describe the sample and my experience of doing ethnographic fieldwork in a mobile and isolated research setting. In particular, the chapter explains how I dealt with a number of ethical issues which were conditioned both by my research topic and my background. It further describes some precautions I took to safeguard participant confidentiality as well as in the interest of my personal safety.

Chapter four introduces the case study which this thesis reports on. Locating the case study in the container sector of the shipping industry, the chapter then outlines the company profile, its regulatory compliance history, ship staff job responsibilities and an overview of the company environmental management system.

Chapters five, six and seven present an analysis of empirical data derived from my fieldwork. In describing and interpreting the research data, these three chapters identify and critically consider the factors influencing the practice of complying with environmental requirements in the case study. Chapter five describes the operation of environmental programmes in relation to garbage management, sewage and ballast water requirements. Company procedures and practices for managing ships' atmospheric emissions and for preventing oil pollution are examined in chapter six. The analysis in chapter seven takes the interpretation further by examining the practice of environmental compliance within the organizational context of management control. The perspectives offered in all three findings chapters are mainly drawn from written procedures within the company environmental management system as well as from the views of participating managers and ship staff interviewed for this research. I have also made use of my fieldnotes as incorporated in appropriate sections of the analysis in these chapters.

Chapter eight discusses and explains the research findings by re-grouping the main themes emerging from the empirical chapters. Remarking that shared perceptions between managers and ship staff about environmental requirements played a key part in ensuring that environmental practices were consistent on board the ship, the discussion, nevertheless, suggests that there was room for the company to do more to protect the environment and, at the same time, maintain acceptable working conditions on board the ship if it supported work processes which would enable the crew achieve these. With reference to experiences in the management of occupational health and safety in the maritime industry, the discussion reveals that seafarers' perceptions of the impact of company procedures regarding environmental protection differed in some respects from what research tells us about their perceptions in relation to safety management systems.

Finally, this thesis concludes with a summary of my findings. In particular I explain what the results show with regard to the conflict between environmental protection and workers. The conclusions identify the occupational hazards associated with environmental compliance practices on board ships, and the way in which shipboard workers and their managers interpret the potential for harm. I also share in my conclusions the limitations of the study, and what I learnt about doing research from undertaking this particular study. Suggestions are offered about further research in this area.

CHAPTER ONE: ENVIRONMENTAL REGULATION IN THE SHIPPING INDUSTRY

1.0. Introduction

This chapter contextualizes the enforcement of environmental regulation in shipping and further examines the evidence about the health and other work-related impacts on shipboard workers of performing environmental protection-related tasks. In the following four sections, the discussion presents the structure of regulatory enforcement in relation to environmental compliance in the shipping industry and how it affects the work experience. The first section considers why ship-source pollution matters and why it needs to be given adequate attention. The discussion here notes that even though the environmental threats posed by the activities of commercial shipping are in many ways comparable to those of land-based industries, enforcement regimes in shipping are much more complex and stringent. Although they are more strictly enforced at sea, by demonstrating the extent of pollution from ships globally, the discussion nevertheless presents a case for such stringent regulations in the industry.

The second section posits that global regulation has been successful in raising standards with respect to environmental concerns. It highlights the role played by nation states in environmental regulation and emphasizes how crucial the mechanisms within state institutions, such as port state control, are for effective enforcement of global rules for addressing shipping's environmental threats. The discussion further reveals that because nation states have applied international laws on environmental protection to varying degrees, stricter requirements in some regions have forced ship operators to raise standards. However, for ship staff who regularly come into contact with different national requirements, there might be implications for the work experience particularly in situations where ship crews are not up to date with the latest requirements or lack the resources to comply with them.

The discussion in section three notes that the success of state institutions in securing adherence to internationally agreed environmental standards in shipping has been further complemented by the operation of a number of commercial requirements for sound environmental practices in the industry. While ship operators must comply with these market-based requirements or risk being penalized commercially, the discussion

argues that it is legal rather than commercial sanctions that ship staff are more likely to be concerned about.

The fourth and final section of this chapter considers the health impacts of seafarers' compliance with environmental regulations. While there is evidence to suggest that workers in land-based sectors have suffered from occupational health problems as a result of carrying out pollution prevention-related tasks, it is not clear whether their colleagues at sea are experiencing similar problems or if they have been affected at all.

1.1. Shipping and the Environment

Global environmental concerns, as seen today, have to do with a broad range of threats including: pollution of the atmosphere, water bodies and land; the reduction of biodiversity; and the contamination of workers and communities from fallout. The activities of commercial shipping pose environmental threats comparable to those of land-based industries. In the maritime sector these include, oil spills, untreated sewage, invasive species, heavy metals, emissions and marine litter (UNEP 2006). While shipping is confronted with almost all aspects of land-based environmental pollution, the sector is generally considered the more energy efficient and environmentally-friendly option when compared with other modes of commercial transport (International Chamber of Shipping 2013). However, this only becomes evident if one takes into account the extent of pollution per tonne-mile[4]of cargo transported using the different modes of transport. The bulk of global trade is transported by sea (about 95 per cent according to Steinberg 2001) and cargo-carrying ships make up about one half of the world's fleet of sea-going merchant ships (UNCTAD 2011).

Notwithstanding this view, not all forms of commercial sea transport are "greener" than planes or trucks. In absolute terms (of total emissions, litter, effluent, etc.), the negative externalities generated by the activities of merchant ships are reported to contribute significantly to global atmospheric and marine pollution. In 1990, shipping contributed about 12 per cent of global marine pollution (GESAMP 1990, p. 88) and a recent estimate suggests that the sector is responsible for 10 per cent of petroleum inputs into the world's oceans (National Research Council 2003). Air pollution from commercial

[4] This is a measure of the volume of cargo transported multiplied by the average distance over which it is carried.

ships has also been recognized to contribute significantly to global emissions (Dalsoren et al. 2009; IMO 2009[b]). In fact, shipping's global sulphur dioxide emissions have been reported to be more than three times the total level from land-based transport systems (Righi et al. 2011) and its carbon dioxide emissions are almost twice the total amount generated by the aviation industry (Vidal 2007; IMO 2009[b]). Marine and atmospheric pollution can prove costly to society both ecologically and economically. In this regard, the control and management of pollution from ships is necessary for safeguarding the future sustainability of our planet and, in turn, reduces the vulnerability of global ecosystems to climate change.

While the shipping industry might be seen to contribute substantially to global marine pollution, the true scale of emissions from ocean-going ships has been subject to both scientific and regulatory debate (Vidal 2008; Dalsoren et al. 2009). Nevertheless, the attitude of shipping organizations in relation to environmental sustainability has been generally positive. For many such organizations, there is both a moral case and a business one for environmental compliance. Even though the importance of environmental protection is widely acknowledged within these companies, for ship staff, the enforcement of stricter rules in relation to environmental protection at sea may not enhance the work experience. Research tells us that seafarers demonstrate a strong understanding of the rationale for protecting the environment (see, for example, Abou-Elkawam 2009). However, these workers' perceptions about whether the requirement to protect the environment is right or appropriate, is not necessarily static but is continually being shaped by extrinsic influences such as compliance levels in land-based sectors (see also Abou-Elkawam 2011) and seafarers' own cultural practices (Inglehart 1995).

1.1.1. Atmospheric Pollution from Ships

The most visible manner in which ships pollute the atmosphere is by releasing gases from their engines and funnels during the combustion of the fuels on which they run. Ships burn relatively "low-grade" fuel oils which are high in sulphur content (US Environmental Protection Agency 2010) and the combustion of such fuels is thought to be a major cause of acid rain (Penn State 1998). The process of combustion itself releases nitrogen oxide which, in turn, produces a greenhouse gas known as ozone. The atmospheric warming effect of ozone is much smaller than that of carbon dioxide but is equally damaging.

Carbon dioxide is the most important of greenhouse gas emissions from ships. Contributing to over 3 per cent of global carbon dioxide emissions (IMO 2009[b]), shipping is the world's sixth single largest producer of greenhouse gas emissions (Oceana 2008) and, undeniably, a sector which is exacerbating the global climate change problem. As global seaborne trade continues to boom, it is estimated that carbon dioxide emissions from ships would increase by a further 30 per cent by 2020 if nothing is done to reduce the emissions rate beyond current levels (IMO 2009[b]).

Like factory, electrical power plant and motor vehicle emissions on land, atmospheric pollution from the operation of commercial ships can affect biodiversity and human health in coastal communities (Corbett et al. 2007; Pearce 2009; Vidal 2009). In particular, the last two decades has been marked by growing concerns about levels of sulphur and nitrogen oxide emissions along the coast and the effects on coastal climates and populations in the United States, in Asia, and in Europe (Corbett et al. 1999; Corbett and Fischbeck 2000; Streets et al. 2000; European Commission 2002). Sulphur and nitrogen oxides released during combustion from ships have harmful impacts on plants, animals and on the built environment through acidification (Doney et al. 2007; US Environmental Protection Agency 2012). These emissions from ships together with their particulate matter derivatives contribute to about 60,000 deaths from cardiopulmonary and lung cancer each year (Corbett et al. 2007).

Exhaust gases are the primary source of emissions from ships but there exists, nonetheless, less visible and equally important forms of ship-source air pollution. This is frequent in ships carrying oil and volatile organic cargoes, which release harmful compounds of these products into the atmosphere when the ship is under way, and during load or discharge operations in port (Sasamura 1991; GESAMP 2007).

The problem of air pollution from ships has been addressed in many ways. Among these, measures to control sulphur emissions have been the most extensive, with far-reaching financial implications for ship operators (Meade 2009) which affect competitiveness in some shipping sectors (see, for example, Rowbotham 2012; see also UK Chamber of Shipping 2013). Legal limits have been set worldwide on the maximum permissible content of sulphur in ships' fuel oil. There are also designated regions in the world, known as Emission Control Areas (ECA), where more stringent limits apply. For example, ships trading in North Europe or calling at any ports in the region cannot burn fuel with a sulphur content exceeding 1 per cent. Ships are therefore required to switch over to

cleaner fuels when in this restricted area (see also Bloor et al. 2011; 2013[b]). Regional treaty agreements in Europe further require ships to run on even cleaner fuels when at berth (see European Union 1999; 2005[a]). Alternatively, ships can connect to power supply onshore in ports where the facility is available (a process known as 'cold ironing') or use other methods to limit their emissions (e.g. exhaust gas scrubbers, alternative power, etc.). However, some of these measures have not been without problems. While cost has been the main challenge for ship operators (Bloor et al. 2011; UK Chamber of Shipping 2013), ship staff might also face technical and practical difficulties with compliance. For example, the supply of low sulphur fuel is not readily available and, even so, ship staff cannot tell in advance whether the fuel they purchase is compliant (Matthews 2011[a]). Another difficulty is that many ships in operation today are not technically suited for the use of low sulphur fuel (US Environmental Protection Agency 2010). Adapting them to cope with the technical requirements of low sulphur fuel operations might have an impact on the work of ship crews.

1.1.2. Marine Pollution from Oil, Chemicals and Other Hazardous Substances

Historically, ships are known to have discharged huge quantities of oil and chemicals into the world's seas. Major marine pollution incidents from oil which have received considerable public attention include the *Torrey Canyon* (1967), *Argo Merchant* (1976), *Amoco Cadiz* (1978), *Exxon Valdez* (1989), *Nakhodka* (1997), *Erika* (1999), *Prestige* (2002) and *Hebei Spirit* (2007) disasters. Whereas these historical cases of discharges are largely unintentional in nature, oil spills at sea have mostly occurred through routine ship operations such as cargo and bunkering operations (Molenaar 1998; GESAMP 2007).

The extent and frequency of oil spills from commercial shipping is not known but estimates suggest a downward trend (National Research Council 2003). In the tanker sector, where incidents are more common, the number of oil spills from accidents has decreased significantly during the last four decades, from 787 spills in the 1970s to 181 spills in the current decade (ITOPF 2011). A decline can also be observed with the quantity of oil spilled, from over 0.3 million tonnes per year on average in the 1970s to less than 0.05 million tonnes per year on average today.

While there is no comparable data on chemical spills, a review of past incidents occurring in both Northern European and Mediterranean waters suggests about 100 of

these incidents involved the release of hazardous and noxious substances (HNS) during 1987-2006 (EMSA 2007). An analysis of HNS transportation accidents and chemical spills at sea from 1917-2009 (CEDRE 2009) reveals a sharp increase in the number of HNS incidents since 2005. The growing demand for both oil and chemical transport (see UNCTAD 2011) suggests an even greater potential for marine pollution incidents, especially in the chemical trade which has grown faster than all liquid bulk cargoes (Krishna 2012) but wherein the state of pollution preparedness and response has been much slower (Purnell 2009).

Marine pollution from chemical substances on ships does take other forms such as through the use of anti-fouling paints to coat the ship's hull or bottom. These paints, most of which contain organotin compounds, have long been applied to ships to prevent the attachment and growth of algae or other marine organisms on the ship's body (Walters 1996). Whereas the rationale has often been that fouling of ships by marine organisms slows down navigation and therefore increases fuel consumption and other related operating costs (Tan 2006), anti-fouling paints have been found to affect non-target species that come into physical contact with the ship's body (Foale 1993; Følsviksrk et al. 1999; Evans et al. 2000). However, prohibiting their use on ships in favour of more environmentally-friendly anti-foulants adds to the problem of translocation of exotic marine species (Walters 1996), which the industry is already confronted with.

1.1.3. Marine Pollution from Ballast Water

Unregulated discharges of ballast water (carried in ships' tanks to provide stability) also pollute water bodies. This can happen in two ways. First, there is the possibility that the residue of the cargo ends up in the seas (Birnie et al. 2009) particularly in dry bulk carriers which commonly use cargo holds for ballast. On other ship types, such as tankers and container ships which have separate tanks for carrying ballast, harmful organisms may be transported in these tanks, and when these are eventually released into a new environment they become invasive and distort the natural balance of that ecosystem (Carlton 1985; Carlton and Hodder 1995; Drake et al. 2007). There have been reports about reduced aquaculture and fishing yields due to the introduction of non-native invasive species through ballast water exchange (see Ivanov et al. 2000; Oliveira 2007). In particular, paralytic shellfish poisoning from the introduction of toxic dinoflagellates carried in ships' ballast (see Hallegraeff and Bolch 1991) has been a major public health concern. These harmful algal blooms, commonly known as red tides, produce toxins that can accumulate in

shellfish and eating the contaminated shellfish has been associated with severe gastrointestinal and neurologic symptoms in the United States (Fleming et al. 2011). There is also evidence to suggest that persons suffering from asthma and those with similar respiratory conditions, may experience irritation of the eyes, nose, and throat, as well as shortness of breath from breathing the air near red tides or swimming in red tides (Bean et al. 2011; Kirkpatrick et al. 2011; CDC 2013).

Apart from the environmental harm and harm to human health, such introduction is likely to cause a decline in the populations of recreationally and commercially important fishery species, and consequently negative socio-economic impacts in affected communities. Concerns about this form of biological pollution are greatest in the United States, where ballast water discharges are thought to be the source of about 65 per cent of new introductions of aquatic invasive species in the Great Lakes following a surge in shipping activities in the Great Lakes since 1959 (Johnson and Evans 1990; Mills et al. 1993; Tuxill 2012). In particular, the introduction of rapidly growing species such as the zebra mussel (*Dreissena polymorpha*) and the white perch (*Morone americana*) into the Great Lakes and other waters has had significant environmental and socio-economic impacts in the region (Schaeffer and Margraf 1987; Gardner et al. 1995; Nalepa et al. 1999; Madenjian et al. 2000).

1.1.4. Marine Litter and Wastewater

The illegal disposal of garbage and discharge of wastewater from ships, however small (see GESAMP 1990), constitutes a significant threat to the marine environment especially because of the global nature of commercial shipping operations and the continuous expansion of the industry. It is estimated that about two-thirds of marine litter disposed in the oceans and seas, daily, originates from ships (UNEP 2005). Merchant ships have also been identified to be the origin of most garbage that ends up on beaches (Horsman 1982). Marine litter makes beaches aesthetically unpleasant and studies in the United States and South Africa (Ofiara and Brown 1999; Ballance et al. 2000) have highlighted significant economic costs to the tourism industry. Plastics and metals continue to make up a large proportion of this refuse (Dixon and Dixon 1981; UNEP 2009) and can cause harm if ingested by seabirds and marine mammals (Sasamura 1991; Derraik 2002).

The amount of wastewater from commercial ships is not known but estimates in the cruise industry suggest that each of these ships generate about 21,000 gallons of sewage and 170,000 gallons of gray water[5] per day (US Environmental Protection Agency 2008). The discharge of untreated sewage from ships can cause a variety of environmental and public health problems. While the discharge of gray water may be less of a problem, studies show that raw sewage from ships contains pathogens which can contaminate marine organisms (Chapman et al. 1988; Costello and Read 1994). Swimming in sewage contaminated water or eating contaminated sea food can cause illness in humans (Saliba and Helmer 1990; Feldhusen 2000; GESAMP 2001). Sewage is also known to contribute to the enrichment of harmful nutrients in the marine environment which affect coral reefs and damage shellfish beds (Fleming et al. 2006).

1.2. Environmental Governance and the Relevance of the State

Traditionally, governments have been responsible for developing and enforcing policies to regulate both market and social behaviour. New forms of governance today have shifted from the traditional command and control systems to "state steering", towards inter-sectoral policies and to more participatory approaches (Rhodes 1997; Stoker 1998). There have been similar changes in the governance structure of the shipping industry too. Shipping is an international business, and in this context it makes sense to try and reach global agreements on how best to control its environmental impact. The negotiation of several international agreements over the past four decades provides evidence of such attempts to regulate environmental standards in shipping. While national maritime administrations are inevitably a central part of this governance structure, industry associations (including shippers and underwriters) and the commercial relationships between shipping organizations also form part of the institutional arrangements through which the shipping industry is currently regulated.

In the particular context of environmental issues, the governance structure in shipping has not only global dimensions but also national and local ones. For example, in the United States, merchant ships have to comply with federal laws on marine pollution prevention and air quality control, as laid down in Environmental Protection Agency (US EPA) guidelines and Coast Guard (USCG) rules, as well as with individual state

[5] Wastewater which is not classified as sewage. Refer to the analysis in section 5.2 later in this thesis for a full description.

requirements. In Europe, the ships must comply with relevant EU laws on environmental protection and fulfil additional requirements imposed by individual EU member states. Apart from complying with these legally binding rules, some industry associations have developed their own standards and best practice against which ship operators can voluntarily assess their performance. The Oil Companies International Marine Forum (OCIMF) and the Chemical Distribution Institute's (CDI) Marine Scheme are among well-known voluntary trade associations with an interest in improving the environmental performance of shipping and promoting the environmentally responsible operation of ships. Self-regulation initiatives can also be seen in the operation of environmental management systems within some shipping companies. Similar requirements for demonstrating environmental compliance to business partners are increasingly being implemented within shipping companies.

It has been argued that globalization and trade competition will lead to a downward convergence of environmental and labour standards internationally (Murphy 2004). Environmental challenges including global warming, atmospheric pollution and other forms of pollution that transcend geographical boundaries have been associated with economic globalization (Bridges 2002). In the absence of market regulation, the suggestion is that stiff competition will result in poorer environmental practices among businesses and ultimately, drive standards down.

In the context of this changing governance structure towards more devolved systems and market-based arrangements, some scholars have argued that the nation state is losing its salience in this process and especially, that traditional state capacity appears to have been relinquished to supranational agencies (Holton 1998; Hirst and Thompson 1999; Rai 2008). It is certainly the case that the growing integration and interdependence of economic and social activities worldwide (Ritzer 2011) have necessitated global rule-making, to address some of the issues associated with economic globalization. Other scholars have suggested that within this global governance architecture, the nation state is still central and the prominence of its regulatory function can be seen in the political interactions of nation states to tackle global problems jointly through supranational institutions (Scholte 1997; Hirst and Thompson 1999; Waltz 1999). The role of state institutions in regulating markets is further evident in the plethora of rules, standards, guidelines and recommendations which have been developed through inter-governmental consultation mechanisms at the supranational level. In the context of environmental

affairs, the United Nations Environment Programme (UNEP) is the global agency which coordinates environmental policy agreements at the multilateral level but it is not the only forum through which nation states have acted jointly to address environmental protection problems. For example, the 1992 Earth Summit in Rio de Janeiro was instrumental in the adoption of the United Nations Framework Convention on Climate Change (UNFCCC), an ongoing global political process to protect the climate system by controlling greenhouse gas emissions into the atmosphere.

In the shipping industry, the International Maritime Organization (IMO) is the global institution which facilitates such consultations and policy-making on regulatory compliance issues in relation to the environment. Marine and atmospheric pollution from ships are the two main areas of environmental concern in shipping which nation states have addressed extensively through the IMO. Major international treaty agreements reached by nation states on the protection of the environment can be found in the International Convention for the Prevention of Pollution from Ships (1973 as modified by the Protocol of 1978) or MARPOL, and in the United Nations Convention on the Law of the Sea (1982), also known as UNCLOS (see IMO 2012). Other equally important environmental concerns relating to the operation of ships that have been addressed through international treaties include, ballast water management (the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004); the use of harmful anti-fouling systems on ships (the International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001); and ship recycling (the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009).

MARPOL is the most important of international agreements which seek to address pollution by ships from both operational and accidental discharges. There are two other very closely related waste management conventions – the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972 and its 1996 London Protocol); and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989) – but both conventions apply to waste that is transported by sea as cargo rather than waste generated on board ships, which is covered under MARPOL. Most provisions in regulations relating to the prevention of ship pollution from antifouling hull coatings and from recycling activities (except where crew may be involved in preparing the ship for reception at the recycling facility) generally apply to ship operations that take place on land, and their enforcement mostly targets land-based

organizations such as marine paint suppliers, ship repair yards and reception facilities. As such, these regulations, although equally relevant, do not influence the everyday practice of environmental compliance on ships.

MARPOL regulations are organized into six different categories which make up the annexes of the convention in the following order: (1) oil; (2) noxious liquid substances carried in bulk; (3) harmful substances carried by sea in packaged form; (4) sewage; (5) garbage; and (6) air pollution. All state parties to MARPOL are bound by measures under the first two categories (Annexes I and II) and the other four (Annexes III to VI) are optional. Provisions for the prevention of oil pollution, the control of noxious liquid substances in bulk, and measures to prevent garbage pollution from ships have been in force since the 1980s. In the early 1990s, a number of requirements governing the carriage of harmful substances in packaged form on ships came into force. These were followed by requirements controlling the discharge of sewage and emissions from ships which became effective half a decade later. There have since been amendments to these regulations, the latest of which are due to enter into force in January 2013. The most important features of these recent regulatory developments include, the prohibition of all garbage disposal (with applicable exceptions); new discharge requirements for passenger ships while in a restricted area; and energy efficiency measures for reducing the amount of greenhouse gas emissions from ships.

Whereas supranational regulatory bodies such as UNEP and the IMO have been successful at facilitating the negotiation of environmental agreements between nation states, they do not have any direct enforcement mechanism of their own. Nation states have again retained their traditional regulatory function by serving as a mechanism for locally enforcing global environmental rules and standards. For example, emission reduction commitments under the UNFCCC's Kyoto Protocol have been achieved by industrialized countries in Europe and worldwide through the implementation efforts of individual states (European Environment Agency 2011; Olivier et al. 2011). In the shipping industry, the implementation of environmental agreements is the responsibility of state parties who agree to make these regulations part of their own national legislation. Specifically, the effectiveness of global environmental regulation in the shipping industry has been achieved to a great extent through supplementary controls by third states to ensure compliance with the legislations in force (DeSombre 2006; Barrows 2009). This practice, known as port state control (PSC), normally involves inspecting foreign ships in

national ports or when ships are outside the jurisdiction of their flag state[6] (see Smith 1988; Molenaar 1998). Under this arrangement, nations have the power to detain foreign ships in port if they do not comply with the regulations. Ships can be detained until they have met the agreed standards (see Abbott and Snidal 2009). The robustness of state regulatory enforcement of global rules is further reflected in the inclusion of a "no more favourable treatment" provision in international environmental regulations, as is the case with MARPOL, so that ships registered in countries which have not accepted the regulations can still be subjected to compliance with minimum standards laid down in these regulations during port state control inspections.

However, some national differences persist (e.g. due to local green practices, different legal/political systems, geographies or social climate) and may be a barrier to uniform enforcement of global environmental standards. Regulation affects society or economies differently and for this reason, it has often been used as a "tool of statecraft" (Luttwak 1990) by nation states to protect their interests in the global market-place. This is evident in the practices of nation states where, in spite of their vital role in enforcing global rules, states have applied environmental laws to varying degrees (Braithwaite and Drahos 2000). For example, EU member states enforce higher sulphur emission reduction standards for ships berthing in European ports because of the improved air quality and health benefits to citizens that will be gained from further reduction (European Commission 2011, p.1). An EU Directive (Directive 1999/32/EC as amended; see European Union 1999; 2005[a]) requires that ships at berth and at anchor within European ports use marine fuel with a sulphur content of no more than 0.1 per cent by mass – much higher than the IMO's upper limit of 1% which applies when ships are inside of sulphur emission control areas (SECAs). Interestingly, in the broader context of port state control, the application of environmental rules to varying degrees has often involved nation states imposing more stringent requirements. This is reflected in the practices of regional port state control organisations across Europe and in the United States.

[6] A ship's country of registration which exercises regulatory control over the vessel including, inspections, certification of crew and equipment, and issuing documents of compliance with international requirements.

1.2.1. National Differences in Regulatory Enforcement

In the Paris MoU, which is the earliest of regional port state control regimes, and which governs agreements on port state control in Europe and the North Atlantic region (including Canada), participating maritime authorities previously committed themselves to inspecting one-quarter of the average foreign vessel calls at their national ports over a three year period (Paris MoU 2009[a]). With increased membership of the Paris MoU and the associated increase in port state control inspections, the target inspection rate of 25 per cent has recently been abolished in favour of a new inspection regime[7] which rewards quality ships with longer inspection intervals and subjects problem vessels to more frequent and expanded inspections (Fairplay 2010). Since its implementation in 2011, ships have been targeted based on their "risk profile", which includes factors such as type of ship; age of the ship; performance of the ship's flag; class (classification society[8]) performance; and previous deficiencies or detentions.

Unlike arrangements in Europe, port state control in the United States takes a slightly different but rational and systematic approach. In particular, the criteria for selecting ships for inspection are reached based on an objective analysis[9] which involves using a "boarding priority matrix" (Özçayir 2004; USCG 2012[a]; 2012[b]). In this matrix[10], the United States Coast Guard (USCG) assigns points to the various stakeholders responsible for the vessel's compliance with standards in the shipping industry – that is (1) owners and operators; (2) flag states; and (3) classification societies. The sum of points scored in these areas taken together with other performance based factors – such as the ship's history or the ship type and the cargo they transport – would then determine a ship's boarding priority.

Some more stringent port state control practices in the United States have to do with individual state inspections where some jurisdictions have adopted their own inspection programmes (Özçayir 2004). For example, US Coast Guard boardings can be

[7] Requirements under the New Inspection Regime (NIR) are based on EU Directive 2009/16/EC on port state control (see European Union 2009) and the national legislation of Paris MoU member states.

[8] Classification societies originally provided independent technical assessment of ships for insurance purposes. Today, they also verify compliance with statutory regulations on behalf of flag administrations.

[9] Until the new EU Port State Control Directive 2009/16 came into force in 2009, the USCG matrix was the only risk-based approach to PSC targeting worldwide.

[10] The boarding priority matrix includes both a safety and environmental protection compliance targeting matrix; and a security compliance targeting matrix.

followed by state or local government agency inspections for pollution prevention and air quality control. The US State of California is a case in point, where clean fuel regulations would force ships calling at any of its six ports to use onshore power when berthed (Fairplay 2011).

Individual US States are also entitled to impose more stringent requirements[11] for ballast water management than the standard required by federal regulations[12]. While tough new global requirements for the exchange of ships' ballast water will be phased in worldwide once the Ballast Water Convention comes into force, the United States is not only one of many countries in Europe and the Americas already enforcing the requirements but is also the most intriguing of such cases of early enforcement. For example, ballast water regulations in the US state of New York require all commercial ships entering its waters, whether discharging ballast water or not, to install approved ballast water treatment technology to treat the water in order to meet state specific ballast water discharge standards (Tuxill 2012). Such strict enforcement of ballast water discharge standards in the United States is not surprising considering the scale of environmental and socio-economic impacts from the introduction of aquatic invasive species (see, for example, Johnson and Evans 1990; see also Mills et al. 1993).

While it is perfectly legitimate for nation states to impose more stringent environmental requirements in the interest of society and that of the local economy, the imposition of additional standards for protecting the environment in some parts of the world could have far-reaching implications for the practices of workers in a globalized industry such as shipping, who typically have repeated interaction with a broad mix of regulatory systems. It is not clear whether crew working on board ships calling in the region may be up to date with these local requirements or whether they are even equipped to comply with the required ballast water discharge standards (see, for example, IMO Resolution MEPC.124(53) (IMO 2009[a]); see also Lloyd's Register 2012).

The same can be said of MARPOL regulations, particularly the provisions under annexes I and II (which prohibit and control the discharge of oil and chemical substances, respectively, from ships), which have been frequently revised to keep up with new

[11] At the time of writing, US States could effectively do so under the provisions of the Clean Water Act. See Department of Environmental Conservation (2012) for the case of New York.
[12] USCG and US Environmental Protection Agency (EPA) standards.

technology and to take account of the precautionary principle[13]. As a consequence, shipping companies and their sea-going personnel may have been challenged by the need to keep abreast of new legislation in this area. Without any doubt, there would be mechanisms in place within compliant companies to keep ship staff up to date with relevant environmental requirements but it is not clear whether shipboard workers always receive adequate support from their shore-based managers. Furthermore, economic considerations have been identified as a constraint in the fulfilment of environmental protection obligations in the shipping industry (see also Abou-Elkawam 2009). In regard to this, it is important to ascertain how seafarers and managers interpret company environmental policy, and whether they perceive the process of complying with these requirements to affect ship staff.

The enforcement of strict environmental requirements to varying degrees through stringent port state control practices in the United States and in Europe might be an issue for workers on board ships calling at ports in these countries. Ship staff may be concerned about the outcome of regulatory inspections in instances where they are inadvertently found to have breached environmental requirements in strict countries. For example, organizational difficulties with meeting environmental standards at the shipboard level, such as with the practicality of fuel switching on ships to limit emissions (see, for example, US Environmental Protection Agency 2010; Bloor et al. 2011) and the lack of adequate port reception facilities for disposing ships' waste (see Abou-Elkawam 2011), suggest that instances of non-compliance may not necessarily be deliberate. It would be interesting to explore how ship staff cope in situations like this and how the prospect of regulatory inspections in strict countries might impact on the way in which seafarers go about their duties.

1.3. The Business Case for Environmental Compliance

Not only has the nation state had an important role in preventing the downward convergence of environmental standards through the negotiation of international treaties globally, and through the enforcement of regulatory requirements locally, environmental standards have also been preserved through pressures from civil society groups and other

[13] The precautionary approach recognizes the need to take preventive action whether or not there is sufficient ground to believe that discharges introduced into the marine environment may cause harm.

third party interests (DeSombre 2006; Barrows 2009). There are growing demands for accountability among the general public who appear to be taking a keener interest in the environmental performance of businesses (Greeno and Robinson 1992). Shipping is among many other global industries in the manufacturing, transport and offshore sectors, which have increasingly been confronted with strong opposition from environmental groups (including Greenpeace and Friends of the Earth) about the environmental impact of its activities (see also Pearce 2012). It is not surprising therefore, that many companies have gone the extra mile to review their processes in order to ensure more transparency and greater accountability in relation to the environmental impact of their operations.

However, within shipping organizations, the move by companies to maintain environmental standards at acceptable levels has not necessarily been driven by a moral responsibility to protect the environment in line with societal expectations but rather by the losses that the organization may incur from not doing so (see also Regens et al. 1997). Ship-source pollution incidents can have a significant financial impact on a company's profitability (for example, through increased insurance premiums) and may also damage a company's public image and business reputation (see also Grasmick and Bursik 1990). Underwriters are increasingly seeking environmental compliance-related information on ships and their operators not only to be better informed about the circumstances of the ships and shipping organizations with which they are dealing but also to encourage and recognize best practice in their insured risks and, where necessary, to work with ship operators to manage the risks in advance (Mandaraka-Sheppard 2009; AGCS 2012). This practice could soon spread to other supply chain stakeholders including, ports[14], buying organizations (see also Quinn 2013), shippers and even financiers (Sustainable Shipping Initiative 2011).

Commercial shipping interests, such as protection and indemnity (P&I) clubs, classification societies and industry associations (e.g. cargo owner groups and trade associations) have played a significant role in getting ship owners and ship operators to adhere to high environmental standards even in the face of stiff competition. For example, while P&I clubs will provide insurance cover to protect their members[15] against third party liabilities arising from pollution incidents (e.g. oil spills), the clubs will typically limit

[14] A number of port authorities including, Long Beach in the United States and Rotterdam in Europe, have already introduced voluntary incentive programmes to reward green ships. See also BMT 2000.
[15] Club members are typically ship owners, ship operators or other persons hiring a ship for private use. Members contribute to the club's common pool (which operates essentially as a mutual) from which claims are paid.

membership to ship operators with sound environmental practices and may require that members demonstrate a continuing commitment to environmentally responsible shipping practices to retain club membership.

Just as P&I clubs can hold their members to acceptable environmental standards, there are market penalties for ship owners who change their classification society as a means of regulatory avoidance. This practice, commonly known as 'class-hopping', can increase competition between classification societies and consequently, relax the environmental standards to which ships in a particular class must be maintained. However, the establishment of a transfer of class agreement between classification societies within the International Association of Classification Societies (IACS) authorizes member societies to disclose any information relating to the maintenance of class of the ship. This requirement to disclose a ship's full classification history makes it much more difficult for ship owners whose vessels are not environmentally sound to change classification society (see also Cariou and Wolff 2011) because any outstanding corrective action from previous societies must be completed before a new member society can accept them. Ship owners are further prevented from switching between classification societies to avoid having to take remedial action required by the first society because member societies that permit this flexibility risk being penalized (disqualified) by IACS (Mandaraka-Sheppard 2009).

The growing awareness about environmental sustainability among businesses today, particularly in relation to environmental pollution and its prevention, has prompted some organizations to be careful in their dealings with suppliers and contractors many of whose business operations often produce unfavourable environmental outcomes (see also Green et al. 1998). Within such organizations, environmental policy has been implemented across the entire supply chain in order to reduce the environmental risks passed on through external actors (see Vachon and Klassen 2006; Gonzalez 2011), and especially, in the interest of corporate reputation (see also Greeno 1994). The tanker sector of the shipping industry is a typical example of this practice, where customer requirements play a part in shipping companies' adherence to environmental standards (see also Walters and James 2009).

In order to be able to effectively pursue environmental objectives, shipping companies have had to ensure that ship staff are in tune with company environmental policy and procedures. Shipping companies are keen to ensure that the environmental practices of their sea-going personnel do not produce deficiencies (e.g. non-conformities

spotted during commercial audits and regulatory inspections) which could result in fines (see also US Department of Justice 2005), costly delays in port and, ultimately, the loss of goodwill. However, the remoteness of ships as a business unit has required shipping companies to implement extensive procedural controls to monitor the environmental practices of ship staff. The implementation of this form of management control in relation to health and safety on board the ship has been perceived by ship staff as unnecessarily prescriptive and time-consuming (Knudsen 2009; Bhattacharya 2009; Ellis 2005). It is not clear whether seafarers are also experiencing adherence to company procedures in relation to environmental protection as conflicting (see also Grey 2010) and whether implementing the procedures would result in fatigue or compromise safety (see also Bailey et al. 2012; Olser 2012).

Unlike in workplaces on land where the principal actors in the labour process often co-exist in close proximity, within contemporary shipping organizations the remoteness of ships as organizational units means that the boundaries between ship staff, their managers and the ship owners are continually being established and reconstructed both spatially and temporally. As such, the presence of management control on board the ship – or the lack of it – may not necessarily be felt in the same way as it would in the case of land-based organizations. It has been argued that most theories of the workplace view workers simply as objects of manipulation (Hodson 1991) who depend solely on oppressive forces to fuel resistance and change in organizing processes (Knights 1990; Murphy 1998). An interesting analysis of the labour process in Canada (Heron and Storey 1986) highlights the ways in which labour conflict is inevitable in the capitalistic workplace. The contributors demonstrate how Canadian workers strive to maintain a balance between their employers' requirements to maximize production and profitability, and the workers' own interests in securing their livelihoods and in ensuring that they were not too fatigued to sustain future work demands. While these opposing interests of workers and their employer can result in worker resistance (Ray 1986; Jermier et al. 1994; Murphy 1998), it would be interesting to see whether similar pressures associated with environmental compliance on board ships are actually met with any strong reaction from ship staff.

1.3.1. Seafarers and the Corporate Cost of Non-compliance

The financial consequences to shipping businesses of not adhering to commercially driven environmental standards are significant but these may not be as immediately

obvious to ship staff as are the consequences of breaking legally binding environmental rules. The application of penalties to ship operators and their crew could be a cause of worry for ship staff especially because of the fear of criminal sanctions (see also Mitroussi 2008; Abou-Elkawam 2011). Nation states can draw on Article 230 of UNCLOS to impose sanctions on foreign ships and their crews where the pollution occurs in territorial waters and "is wilful and serious" (United Nations 2009, p. 115). Provisions in Annexes I and II of MARPOL have been successfully applied in jurisdictions such as the European Community and in the United States, to punish and dissuade infringements (see European Union 2005[b]; 2005[c]; Coutu 2005; Jefferies 2006). However, controversy surrounding the determination of liability for acts of oil and chemical pollution from ships across different jurisdictions suggests that unfair treatment of seafarers can arise from different interpretations of environmental standards at the local level. For example, while MARPOL specifically exempts the ship's captain from liability for pollution damages "provided that all reasonable precautions have been taken after the occurrence of the damage" to prevent or minimize it, and under circumstances where such action was unintentional on their part (see Regulation 11 (b) of Annex I and Regulation 6 (b) of Annex II), in the European Community, exemption from this liability applies to all crew members (see European Union 2005[b]) and the Community's application of "serious negligence" in Article 4 of the Directive (see European Union 2005[c]) appears to be open to interpretation by member states (McLaughlin 2009[a]).

In spite of the legitimate application of criminal and monetary sanctions by nation states for intentional discharges of polluting substances from ships, due process has not always been observed. In many instances, foreign crews have been detained as "material witnesses" and often without right to legal counsel (see, for example, Jefferies 2006, p. 281) or as a means of "financial security" (see also the case of the *Million Hope* 1996 and of the *Asean Liberty* 2000 in BIMCO 2006, pp. 16-17). Concerns among industry practitioners about irregularities in the application of international law and differences in legal approach in relation to environmental crimes (see, for example, Mukherjee 2006; Wallis 2009; Eason and McLaughlin 2009) have highlighted the extent to which ship staff are vulnerable. The case of the *Hebei Spirit* (2007) is a clear example of how both innocent and guilty seafarers can be trapped in criminal investigations of ship-source pollution incidents. Great harm is often done to these workers before the matter is decided (Jefferies 2006). Such harm may arise from prolonged separation of seafarers from their families and loved ones during detention; deprivation of personal liberty without legal aid; declining morale and

productivity of fellow crew members from the prospect of a detention; and a general unattractiveness of seafaring as a career (Mitropoulos 2004; Gard News 2005; Jefferies 2006; Mukherjee 2006; Mitroussi 2008).

In recent times, the shipping industry has taken a more proactive role in raising awareness on the growing trend towards criminalization and in supporting individual cases (Swift 2006; Wallis and Meade 2009; Matthews 2009; McLaughlin 2009[a]; McLaughlin 2009[b]). However, this practice is not uniform across the industry and many seafarers have gone without support from their company (McLaughlin 2009[b]). While many good employers are taking steps to protect their sea-going personnel from criminal sanctions, it is not clear whether these workers are confident enough of this in discharging their duties aboard the ship.

The feeling of fear can contribute to psychological stress in the work place (see also Cobb and Kasl 1977; Heaney et al. 1994) but there is currently no evidence to suggest whether or not ship staff are experiencing significant pressures as a result of environmental compliance. However, research has linked compliance with procedures in relation to the management of health and safety on board the ship to negative feelings and fatigue amongst crews (Knudsen 2009; Bhattacharya and Tang 2012). Because most health, safety and environmental management systems in workplace seek to report on individual behaviour and to modify it (Hopkins 2005[b], p.2), the assumption may be that seafarers would experience company procedures in relation to environmental protection in the same way as they do in the case of safety management systems. Nevertheless, this can only become clearer if there is evidence about how seafarers perceive environmental compliance procedures to affect them.

Additionally, there might be other job stressors associated with pollution prevention activities on board the ship linked to seafarers' interpretations of management systems. Factors such as organizational (resource) constraints, increased workload, long working hours and the lack of control can contribute to the experience of stress in the workplace (Nixon et al. 2011) and a study of workers' representations of work-related stress (Kinman and Jones 2005) suggests that stress can actually be experienced as a result of a combination of several of these factors. In the shipping industry, fatigue from working longer hours has been associated with poor psychosocial wellbeing amongst ship crews and is thought to be among the underlying causes of accidents and injuries at sea (Wadsworth et al. 2008). The working and living conditions on board ships are associated with job

stressors (e.g. separation from home and family, and crowded living conditions) which seafarers are inherently confronted with (see Alderton et al. 2004). This suggests that negative working conditions which are perceived as a direct result of shipboard environmental compliance would be adding to the existing problem of fatigue and stress at sea.

Workplace stress has been traditionally examined in relation to health and disease (Karasek 1979; Kuper and Marmot 2003) and while the stressful nature of high job demand when combined with low autonomy has been widely acknowledged by such studies, individual (lay) accounts of stress at work point to more than just a departure from physical wellbeing. In one study (Kinman and Jones 2005), one-third of participants described stress in terms of the experience of negative conditions in the workplace (pressure, heavy workload and an unsatisfactory physical environment, pp.107-108) while only a small number of participants (20 per cent, p.108) perceived stress in terms of the experience of ill-health. Workplace stress has also been linked to organizational changes in the nature of work. For example, the implementation of total quality management (TQM) in the financial sector left staff feeling that they were being given too much work to do for very little reward (McCabe and Wilkinson 1997, p.24; see also Kinman and Jones 2005) and managers dismissed such complaints from staff as “cynicism”. Similar management systems operate in the shipping industry for the purpose of environmental compliance and it is worth exploring whether they are perceived to intensify work on board the ship and what job demand factors and psychosocial risks might arise from their implementation (see also Sewell and Wilkinson 1992; Delbridge et al. 1992).

1.4. Earlier Studies about the Impact of Environmental Compliance on Workers

Few studies have addressed the impact of complying with environmental regulations upon worker roles and health. Studies of environmental compliance in the workplace have mainly focused on what drives compliance rather than how it affects employees who are responsible for fulfilling the requirements (see, for example, Winter and May 2001; see also Roy et al. 2001). The impact upon workers of environmental compliance is also largely under-researched in the shipping industry. While studies in this sector have successfully examined the operation of some environmental protection-related

activities (see US Environmental Protection Agency 2008; Bloor et al. 2011), it remains to be known what complying with these requirements means for ship staff who are involved in the everyday performance of pollution prevention, and how they might be affected. This section examines what previous research tells us about the work experience of complying with environmental requirements in general and what little is known in the case of the shipping industry.

Shipboard workers may have little in common with office workers but they do participate in recycling programmes which are similar in character to schemes practised in workplaces ashore. Annex V of MARPOL regulations requires the segregation of ship-generated garbage into the relevant categories (e.g. category 1 for plastics and category 5 for food waste) to facilitate landing in shore-based reception facilities. Research has shown that effective participation in recycling programmes can only be achieved if people know what materials are recyclable and where these can be recycled (Oskamp 1983; Vining and Ebreo 1990). Workers may also be faced with difficulties when complying with recycling guidelines because of poor design of work processes. For example, the use of separate receptacles to segregate waste from source and the proper placement of receptacles have been found to improve recycling behaviour among office workers (Austin et al. 1993; Brothers et al. 1994). In the shipping industry, it is the general lack of adequate waste reception facilities ashore and the reluctance of some ports to accept some types of ships' garbage that has been a major challenge to recycling (see also Abou-Elkawam 2011). Unlike on land where there are several options for recycling garbage, ships are limited in terms of what they can do with the wastes they generate (see also De La Fayette 2008). For example, only a small proportion of solid wastes generated aboard ships can be discharged into the sea, comminuted or incinerated and, even so, within very strict guidelines. The undue retention on board of ship-generated wastes is also prohibited in some jurisdictions (see, for example, European Union 2000). Taken together, these constraints suggest that ship staff can sometimes find themselves in situations where they have to deal with waste disposal whether or not the ship has not been adequately resourced to enable compliance with statutory requirements or even when this would compromise other legal obligations such as hours of rest and seafarers' wellbeing (see also Knudsen 2009; Sampson 2011; Bailey et al. 2012; Olser 2012).

Inadequate training and poor resourcing of workers can affect compliance with recycling guidelines in the workplace but there could be additional implications for

shipboard workers. Unlike office workers, some crew members on board the ship are ultimately responsible for sorting the ship's garbage in addition to their main role as sailors. In this light, the present study explores whether poor participation in recycling programmes on board the ship and failure to adhere to garbage management procedures by colleagues could be time-consuming or stressful for affected crew.

Studies have demonstrated a potential for occupational exposures to a number of health hazards among workers engaged in pollution reduction and recycling activities on land. For example, epidemiological studies of sewage workers at wastewater treatment plants on land have reported occupational exposures to toxic gases and pathogenic organisms (Friis et al. 1993; Ambekar et al. 2004; Albatanony and El-Shafie 2011). Wastewater treatment is performed on board ships as part of complying with environmental regulations at sea. MARPOL regulations (Annexes I and IV) require that wastewater (including all types of drainage on deck and from the ship's machinery spaces) be treated prior to disposal or retained on board for discharge within the guidelines. The Ballast Water Convention imposes similar requirements but this only applies to water discharged for the purpose of maintaining the ship's stability during cargo operations and to meet navigational requirements. However, the wastewater management and treatment process on board the ship may not necessarily be identical to land-based practices. There is currently no evidence to suggest whether ship staff performing the task are facing similar exposure levels or new health hazards.

Occupational health problems have also been reported among workers in the waste sorting and recycling industry. For example, workers in garbage sorting plants are known to suffer from severe pulmonary diseases due to airborne microorganisms in decaying waste (Malmros et al. 1992). Other studies of solid waste workers in incineration plants and landfill sites (see Poulsen et al. 1995; see also Porta et al. 2009) have found these workers to be at risk of musculoskeletal and gastrointestinal problems. Of these, workers involved in manual sorting of domestic waste are among the most affected because of higher exposure levels to airborne bacteria and endotoxins (Poulsen et al. 1995). Domestic and food wastes make up a significant amount of solid wastes generated on board ships considering that ship staff work and live on board for very long periods (usually the whole length of their contract). It is possible that individual crew members who take part in manual sorting of solid wastes and designated staff dealing with the ship's aggregate garbage might come into contact with bacteria from these wastes. However,

because the volumes of ship-generated garbage are smaller than those that land-based waste sorters have to deal with, ship staff might not be adequately resourced to prevent the occupational hazards associated with garbage sorting (see also Prüss et al. 1999; WHO 2011[b]). Naturally, shipping companies may not readily appreciate this and some ship managers may even grapple with justifying occupational safety budget increments (e.g. for procuring personal protective gear appropriate for the task) for what would logically be considered a secondary activity on board the ship.

Indeed shipboard workers may have to deal with a greater variety of regulated waste streams than workers in any single land-based industry do. Because they are only carrying out the associated-tasks occasionally, ship staff may be exposed to occupational hazards at levels which could easily go unnoticed. For example, symptoms of illness from occupational exposure have been reported among oil pollution response workers and volunteers in the offshore oil and gas industry. A recent health hazard evaluation of response workers in this industry (King and Gibbins 2011) identified a potential for dermal contact with oil when deploying and reassembling clean-up kit and during cleaning activities. MARPOL regulations (see Annex I) require ship staff to take all necessary measures to clean up and contain an oil spill. There are contingency plans within the shipping industry for addressing oil spills from frequent and high risk operations such as bunkering procedures. However, these procedures may not be so relevant when it comes to responding to operational ship-source oil pollution incidents of a much infrequent nature or accidental discharges of a smaller magnitude (for example, spots of oil on deck from the ship's crane or leakages from cargo).

As part-time waste workers, shipboard workers may not necessarily respond to the need for personal protection when performing associated-tasks in the same way that their land-based colleagues do, and therefore basic safety precautions might sometimes be overlooked. It would be interesting to explore what personal protective measures are in place to safeguard seafarers' health when working with potentially hazardous wastes (e.g. garbage and oily wastes) and whether ship staff (and their shore-based managers) perceive the practice as damaging.

1.5. Conclusions

This chapter has examined the relevant literature on environmental regulation in the shipping industry and what is known about the everyday practice of compliance in relation to worker roles and health. The argument has involved a number of important points. In spite of the existence of statutory requirements for maintaining environmental standards globally, enforcement remains the main challenge of environmental regulation in the shipping industry. Nevertheless, in response to environmental regulation, shipping companies have generally complied in tighter regulatory contexts. This has been largely due to the imposition of additional and often more stringent requirements by nation states and, in some sectors of the industry, by the operation of strict commercial standards for companies to demonstrate environmental sustainability. While there may be a case for more stringent rules or even for criminal sanctions to deter deliberate acts of violation, there are, however, serious concerns about what this could mean for seafarers who are ultimately responsible for the everyday performance of pollution prevention on board the ship. There is a potential for experiencing anxiety and psychosocial stress from the regulatory and commercial pressures with which seafarers are faced in relation to environmental compliance which is worthy of further exploration.

The environmental impact of shipping is significant on a global scale. Even though the attitude of major shipping companies owned/operated in OECD countries towards environmental compliance is frequently positive, it does not necessarily mean that their front-line personnel are of the same view. Ships being remotely managed workplaces, shore-based company managers can easily side-step their environmental protection obligations so that ship staff would actually be shouldering the responsibility. Thus, in spite of the existence of an environmental policy in some shipping companies, non-compliance can still occur because the companies have not taken control measures to prevent this. Therefore, this thesis will explore how seafarers interpret environmental management systems and requirements within companies, and whether they perceive complying with these requirements as damaging. This will involve ascertaining what programmes are in place; examining whether seafarers and their employers are concerned about any health risks associated with the compliance programmes in place; and finding out if ship staff are concerned about the effects on the physical job performance and on job satisfaction.

Knowledge about the effect of environmental regulation on workers in the shipping industry is weak. A review of the relevant literature suggests that workers in other sectors

have suffered from occupational exposures and psychosocial stress as a result of the fulfilment of environmental protection-related tasks. Seafarers may have experienced impacts of environmental compliance similar to those of workers in other sectors, but they might also have been affected in new ways. However, this is not clear. For this reason, this thesis seeks to explore the understandings of seafarers and of their employers, about the operation of environmental programmes on board the ship and how they perceive the daily practice of pollution prevention at sea to affect ship staff. The research will examine how five different shipboard environmental programmes – garbage, sewage, ballast water and oil and air pollution – were being implemented at one shipping company. The analysis will highlight operational issues faced by ship staff carrying out the requirements and the organizational reasons for these. Attention is also drawn to how seafarers perceived psychosocial conditions produced by the monitoring and control practices of the company to ensure shipboard compliance, and those influenced by external pressures such as regulatory inspections in port, to affect them. However, in order to effectively do this, it is necessary to begin by clarifying what methods will be adopted in this study, and this is the subject of the next chapter.

CHAPTER TWO: FIELDWORK PROCEDURES

2.0. Introduction

This study explored the ways in which global environmental regulation affects workers in the shipping industry. In particular, it considered the understandings of both seafarers and managers about what environmental compliance entails, and whether they felt that there might be any adverse job-related and health consequences for ship staff.

The research adopted a qualitative case study design and it involved the use of three methods: semi-structured interviews; non-participant observation; and documentary analysis. The example of a relatively compliant shipping company used in this case study is intended to explore the health and job-related impacts of environmental compliance in a setting where it is most likely to occur (see Goldthorpe et al. 1968). This approach – known as a "critical case" – was used by Goldthorpe and his colleagues to test the thesis of working-class embourgeoisement. Following their strategy of defining what would constitute an "ideal kind" for the purpose and subsequently locating a "real-life approximation" of this (p.2), I consider similarly that a relatively compliant company would be the best place to study the impact of environmental compliance on workers.

This chapter is divided into five sections. It begins with a discussion of selecting research where I attempt to trace the origins and development of the research idea that led to this thesis. This is then followed by four other sections: designing the research; analysis of data; dealing with risk in the research; and finally, a section about what I learnt from doing a pilot. The chapter concludes with a summary.

2.1. The Selection of Research: studying up and down

Important concerns about personal involvement in the research process were raised by Weber (1949) who admitted that the selection of research was guided by value judgment and intricately linked to societal problems. Weber suggests that different scientists can assign different meanings to the same social action. The interpretations of "truth" and "accuracy" could then depend on the theory held by the scientist. Other commentators have argued along with Weber for the need for clarity among social scientists about their own values and ideals and possible implications for their work. In

particular, Wright-Mills argues: “the social scientist is not some autonomous being standing outside society. No-one is outside society, the question is where he stands within it” (1959, p.204). Following on from this and as a prelude to my own research, it remains questionable whether any individual can produce objective knowledge (Ramazanoğlu and Holland 2002).

However, knowledge produced from social research can only be valid where researchers acknowledge the effects and importance of their role and choices in how they construct, reconstruct, write about and represent the social world which they investigate (Becker 1970). I therefore recognize that by doing research, I am playing an active role in the social construction of social reality (Bryman 2001). I also acknowledge that the ways in which I relate with others in the field are a meaningful component of the social world (Mason 2002). I do not however consider my research participants to be vessels of information (Holstein and Gubrium 1995). I see them more as producers of meaning, and meaning itself entails varied interpretations, influences behaviour and generates further interpretations (Hammersley and Atkinson 1995). It then seems to me that perhaps the most legitimate way to produce knowledge is through the accounts and articulations of people with whom we interact (Mason 2002). Perhaps a good way to start then would be to acknowledge my own personal circumstances and where both I and my research have come from.

2.1.1. Research Biography

The origins of my connection with the social sciences and hence the present research can best be traced from my theoretical background. I read Economics at the university and when I graduated, I had little opportunity to engage with the banking, finance and other commercial sectors as did most of my peers. Instead, I taught economics in summer school for two sessions and then later volunteered to do civil society work. Working for the non-profit sector, I was exposed to realms of power struggles and conflicts of interest both within my organization and at partner institutions. I also observed that civil society actors appeared to have separate interests while the masses remained vulnerable, marginalized and impoverished, and corruption continued to thrive. I was convinced that existing strategies to curb corruption were not effective as they appeared not to have the best interests of the people at heart. So I went on to enrol for a higher degree with a view

to securing a position which would allow me to shape policy making processes more directly.

I studied for a postgraduate degree in shipping outside my home country. It was an opportunity for me to broaden my horizons culturally and especially, in terms of how I understood society. My research interests further exposed me to seafarers from various countries of West and Central Africa who became participants for my dissertation (technological changes and the supply of seafarers). When I later took up a teaching position, I again had seafarers as my students. The contact I had with them exposed me to their work-life experiences. Most of my colleagues are also former seafarers and working with them has earned me similar exposure.

A substantial part of my continuing professional development has involved maritime training courses both at the local and international levels. These were mainly on environmental issues and included opportunities for me to go to sea. However, in my university teaching experience, I observed that seafarers had inadequate environmental awareness. At the time, knowledge of environmental issues was not a core aspect of their certification. I then began to think of ways of improving knowledge on the importance of environmental awareness for seafarers particularly with regards to how different regulations affected them. When this opportunity to enrol for a research degree came, I felt that my line of inquiry must be about environmental regulation and how it affects seafarers.

It has long been argued that sociologists have tended to study more of the disadvantaged and marginalized groups and less of the upper classes and the powerful (Nader 1974; Cassell 1988). Studying workers in ship management organizations in the way that I have done allows both the possibility of "studying up" without however discarding the powerless group. Shipping organizations can be loosely described as comprising onshore staff on the one hand, usually the managers who call the shots. On the other hand, we have front-line (sea-going) personnel, who are often perceived as vulnerable and marginalized (Sampson 2013) in terms of how regulations and the changing shipboard environment appears to affect them, and also about how they relate with the shore-side of the shipping industry. Researching the powerful does not come without its own problems (Cassell 1988). The difficulty of "selling" my research intentions to ship owners and managers was further compounded not only by the potentially sensitive topic and financial risks to the companies, but also by the case study design. Doing a case study meant that I

had to secure access for studying both “up” and “down” through the same powerful group I was going to study.

2.2. Designing the Research

There are methodological debates surrounding how social inquiry should be conducted (see, for example, Layder 1993; Baum 1995; Denzin and Lincoln 2005). In this section, I consider the methods I chose and go on to explore their benefits and drawbacks as well as how appropriate these are for this project. This research adopted a qualitative strategy and employed three complementary methods for collecting data: semi-structured interviews; non-participant observation; and analysis of documents. Interviewing was the main method used and observation and documentary analysis were used in conjunction with the interviews to contextualize and extend the analysis being carried out (Blaxter et al. 1996).

2.2.1. Choosing a Qualitative Design

Denscombe (2007) argues that knowledge generated through qualitative research is embedded in the conditions of social existence. In this study of a small and particular case, I felt convinced that qualitative methods would be suitable for this study because of my search for a deeper understanding of the problem under investigation. I also thought that opting for a qualitative strategy would allow me a more flexible research design and open up possibilities for using and combining a range of data collection techniques according to the social context in which the data were produced (Snape and Spencer 2003).

I did however ponder the ambiguities and contradictions that qualitative analysis allows for. Accordingly, I decided that the onus was on me to demonstrate personal awareness of questions about such things as the inability of qualitative researchers to verify their truth statements (Denzin and Ryan 2007). I also felt the need to reflect on questions of interpretation (Cotterill and Letherby 1994; Denscombe 2007) and criticisms about the limitation of findings to the research setting (Greenhalgh 2006).

2.2.2. Interviewing

Interviews have been widely used as an effective research instrument for eliciting knowledge and perceptions (Hyman et al. 1975; Briggs 1986; Arskey and Knight 1999; Gray 2004) and I found them equally suitable for my study for a number of reasons. First of all, I felt that using the interview technique would allow me some flexibility for clarifying to respondents what specific questions mean; for expanding on them; for following up and also for prompting respondents when they have reached an especially important topic (Bryman 2001; De Leeuw 2008). Secondly, by conducting face-to-face interviews I thought that I would be able to actively structure the interview situation and to observe non-verbal communication. There were often times when people were not loud enough or where they used gestures to communicate or describe something. I had to repeat out loud what they had just said or described so that I could capture this in the data during transcribing. Moreover, my role as the interviewer or the "primary instrument" (Snape and Spencer 2003, p.4) and close contact with the people I was studying enabled me to improve participation by persuading and convincing respondents to cooperate (De Leeuw 2008). I also felt that individual interviewing rather than conducting focus groups will allow participants to comfortably address any sensitive practices or experiences related to environmental compliance in their work-life (Lee 1993; Ritchie and Lewis 2003).

Again, I felt that conducting focus groups might not be easy to achieve both in the Office Interviews because of work commitments, and aboard the ships because of working patterns. For example, I had to travel several times to the Company headquarters for the Office Interviews and follow-up discussions with intervals of over four months. This was because most participants were: either on annual leave or holiday; undergoing training; on a business trip; or simply busy times at the office (e.g. ongoing audits and ship registration). The situation on the ships was even more difficult especially as I had to arrange and manage my interview appointments myself. If people were not working, then they were often either eating or sleeping.

However, to retain what I felt would be the key benefit of doing focus groups, I used examples of things people had said during previous interviews to prompt those who could not readily think on their own. For example, during the Office Interviews, I mentioned things like: oily rags, batteries, mooring ropes, pyrotechnics, etc. as examples of "hazardous wastes" from a previous interview to get participants to talk about how such wastes were managed. An example for the shipboard interviews was asking seafarers if

they had been taken through pre-departure orientation seminars (or "PDOS" which was the more familiar term to them) in an attempt to get them talk about any form of company training they had received towards helping them manage the environment.

In a nut shell, I found interviewing particularly appealing because it made the researcher in me an integral part of the process – from design through to analysis. Unlike in surveys where the interviewer is often passive and neutral, qualitative interviews are a "two-way informational street" (Holstein and Gubrium 2004, p. 143) where meaning is constructed interactively. However, like every other qualitative data collection method, there are concerns about the presence and intrusion of the qualitative interviewer (Rubin and Rubin 1995; Denscombe 2007). I have already highlighted that this can be dealt with by being reflexive in the research process (see also Hammersley and Atkinson 1995; Fielding and Thomas 2001).

Interviews are highly interactional and often involve collaborative meaning-making (Doucet and Mauthner 2008). So part of this reflexivity requires that the interviewer consciously and conscientiously attends to the interview process by keeping "track of what is being asked about in interviews and, in turn, what is being conveyed by respondents" (Holstein and Gubrium 1999, p. 107). For example, I tried not to stick to the interview schedule but rather used it as an "aide memoire". To effectively do so, I treated items on my interview guide as a checklist (e.g. list of practices or specific things the Company did about the regulations – oil, sewage, garbage, etc.). It felt helpful to try and strike through mentally (and where possible physically) by glancing occasionally at what had been covered. But it became even trickier as I sometimes had to juggle with linking up what people had mentioned in a bid to make it easier for the conversation to follow on, instead of asking someone to talk about something they had partially mentioned earlier. I thought they might be offended or feel as though I were asking the same question again. In such cases I adopted the following style:

> *What about oil; you mentioned about re-using leaks and things like that - can you explain a bit more and would you know about other things the company does to manage oil pollution? (Interview with Onshore Personnel 7)*

Going about it in this way often meant skipping through the items on the interview guide (not meant to be hierarchical though) and running the risk of forgetting some of it as the conversation flowed along with newer items or as we moved from "order" to "chaos"

(Blaxter et al. 1996, p. 175). For example, in another interview I forgot to ask the interviewee the question on "ensuring environmental compliance across the supply chain" because things had become really interesting and I had got carried away as we had skipped down to an item nearer the end of the schedule.

2.2.3. Semi-structured Interviews

The first method chosen was semi-structured interviews. Different forms of interviewing produce different kinds of data so I consider it important to discuss why I used interviews as a method of inquiry here in the context of my research questions (Mason 2002). In the literature review, I have argued that seafarers may have experienced the effects of environmental regulation in other sectors and that they might also have been affected in new ways. However, the main question leading my research is: "In which ways have global environmental standards affected workers in the shipping industry?" This is the broad question which this thesis tried and answered. There are however a number of specific and sub-questions:

1. *How have shipping companies responded to global environmental regulation?*
2. *What is the impact of environmental compliance programmes on seafarers?*

The specific research questions above formed the basis of data generation (see Appendices 1 and 2). I selected semi-structured interviews over the structured and in-depth forms (Mason 2002) because of the flexibility its "intermediate" characteristic offers. As such I could conveniently tailor the interview to suit the social encounter without necessarily over-restricting respondents or giving them too much leeway.

Time Management

Time management was another advantage of using semi-structured interviews for this particular study. Just as I had imagined it would be challenging to do focus groups with participants in this industry, I thought that getting them to participate in an in-depth interview would be equally difficult; especially if they were going to be interviewed in the workplace. I also felt that using structured interviews might have been most convenient in such a research setting but not without compromising the reflections, interpretations and

contextualization which were crucial for answering my research questions. As I could not be certain about how long interviewees would want to talk, doing semi-structured interviews came in handy. Again, I felt that semi-structured interviews would be suitable for the varied education levels of the participants. Shipping company office workers, officers and ratings have quite different backgrounds and so a semi-structured interview would afford each target group the flexibility to express themselves in the way that they feel most comfortable with. I felt that this would also permit respondents to offer detailed accounts and that this will help me understand participants' personal experiences of the impact of environmental regulation (see also Miles and Huberman 1984; McLeod 1994; Ritchie and Lewis 2003).

In general, I found it helpful to interview a more "knowledgeable" person first. For example, on the ships I found that speaking to the captain or the chief engineer first, helped me to anticipate what to further explore, clarify or "crosscheck" with the rest of the crew. Similarly, interviewing a senior manager first during the Office Interviews did set the tone too. For example, "subordinates" and colleagues generally tended to feel more comfortable knowing I had spoken to the "boss" or a particular colleague. Occasionally, I did get express referrals. For example, people often pointed me to others saying things like: "…when you talk to the LPSQ [loss prevention, safety and quality] guys…"; "…it's the Technical guys who would know…"; "...he will tell you all about paint, yeah…"; "…are you going to talk to any of the Technical guys?" etc. So I knew in advance where to focus on whom, and what I could and could not expect from whom. This greatly helped in time management.

Another example was trying to get participants in the Company Interview to talk about the "unintended consequences" of environmental compliance (Question 3). I observed from my first couple of interviews that participants were least likely to say much here. At best, they often gave examples somewhat unconsciously or when answering other questions. Subsequently, I decided to introduce this question as a follow-up whenever participants raised it early. I also prompted participants during subsequent interviews by giving them more examples about what I meant by "unintended consequences" and spent more time talking about other things before returning to this particular question. On the ships, I found it easier to get people to talk more regarding the health and safety risks of environmental compliance when they raised it themselves. This was usually while talking about how the practice of pollution prevention in their daily work rather than when I

specifically asked them. In a few cases, however, some participants did respond when asked directly. I had learnt from my second Office Interview that this kind of information would best be obtained from the LPSQ department. So I tried to get participants from this department to talk more when it came to that part of the interview. Similarly, during the Seafarer Interviews I had learnt that hospital waste (Question 5) was the responsibility of the second officer so I aimed to dwell more on the topic when I interviewed participants in that position.

Managing time in the research also meant actively looking out for expressions from participants: for example, whether they were pressed for time especially towards the end of interview. In such cases, I tried to wrap things up or asked more questions if they appeared more willing to talk. I generally used sign post language to let the interviewees know where we were, what was coming on next and how much more was left. For example:

> *We've talked in detail about the different regulations which the company is subjected to and also about how you try to comply with them, and what the company's procedures are. I'm just going to ask you a few more general questions. (Interview with Onshore Personnel 5)*

Getting to the last but one question, I always hinted my interviewees that we were near the end so as to buy more time and to keep them relaxed. I used prompts or sign post words such as: “Just before we conclude…”; “Just before we go…” etc.

Designing the Interview Guide

I designed my interview guides at several levels. The first draft was structured around the main arguments developed in the literature review. I then went on to pilot the instrument and made some significant revisions which I have highlighted under the pilot study section (section 2.5). Again, as I read more literature to develop and update my understanding of the research area, I came across a number of articles which I found useful for adapting my interview guides. For example, I read an article on occupational health problems from waste sorting (Malmros et al. 1992) wherein workers in garbage sorting plants were performing this task as specialists. I was able to adapt my interview guide to include questions about whether seafarers who were responsible for sorting waste aboard

ships (as non-specialists) adhered to the same health and safety standards. When I returned from my first ship visit, I read more literature on the management of medical wastes (Prüss et al. 1999) and offensive and hygiene wastes (Health and Safety Executive 2009). I became more aware of the potential risks associated with handling medical wastes and I was better equipped to explore these in subsequent interviews. For example, following on from the literature on health and safety practices for health-care personnel and waste workers (Prüss et al. 1999, p.141), I was able to ask seafarers how they dressed when they went out to sort waste and whether they were aware of any associated risks.

I did not, however, limit reading around my research area to mainstream sources or academic texts (Delamont 1992). I also considered more unconventional or "grey" literature (Strauss and Corbin 1998). A good example is an article I read about the long-term implications of marketing new ballast water treatment plants for the shipping industry (Lloyd's List 2010). Although the introduction of this environmental protection equipment was not immediately applicable, I was able to think about the implications for a mobile work force of existing environmental protection equipment aboard ships: oily water separators; incinerators; and sewage treatment plants. Thus, I adapted my interview guide for seafarers to capture seafarers' familiarity or non-familiarity with environmental protection equipment aboard different ships and how they felt about learning how to use the same piece of equipment time and again.

Other sources of non-technical literature included industry training videos on environmental compliance. Viewing these helped me to learn about some local rules, for example, regulatory requirements specific to ships entering the United States such as Vessel General Permit and the Clean Water Act (see Videotel 2010). These were particularly relevant for interviews (and observations) during my second ship visit because the ship was trading in this region. Just like my research participants, I found it helpful to stay on top of regulatory developments and issues in my research area. I kept up to date by reading International Maritime Organization (IMO) bulletins and resolutions from its marine environment protection committee (MEPC) meetings. For example, an important development from MEPC 62 which held in July 2011 (IMO 2011) was a draft regulation on new limits for emission control areas for sulphur oxide and nitrogen oxide levels; and proposed new technology for emissions abatement. Air pollution regulations were also updated to include new rules on energy efficiency requirements and management for ships. These came out just in time for my final Office Interviews and because I was already

familiar with these, I was then able to explore the outlook or response from the case study company under Question 2 of the Office Interviews (emissions/air pollution). It turned out that the Company had recently had consultations with a classification society[16] on this and so I had the opportunity to go through relevant documents on what options were available for ship owners.

2.2.4. The Non-Participating Observer

The second method chosen was observations. I did combine the shipboard interviews with non-participant observation because I felt that besides eliciting individual experiences, even where interviews were well designed and conducted reflexively (Williams 1993; Harding 1996; Skeggs 2001), asking participants how they managed garbage and waste on ships alone would give no assurance that they actually do what they say they do. So I had to go out and experience the lives of the people I was studying as much as I reasonably could. One might argue that seafarer participants were going to be interviewed on the ship anyway but collecting interview data alone in this setting would not have amounted to non-participant observation (Bernard 2000). Doing non-participant observation meant keeping systematic notes (Bogdan 1972; Ellen 1984). This took the form of journal entries and "transcriptions" or "texts" secured during the fieldwork encounter (Sanjek 2001, p.275). It also meant establishing rapport in a way that does not distort the normal functioning of things where you are or, as Bernard describes it: "learning to act so that people go about their business as usual when you show up" (2000: 319).

To successfully do this, I adopted a number of approaches. First of all I tried not to do anything about my research in the first few days aboard the ship – not even distributing information sheets. The following extract from my diary illustrates this:

> *Of course I was aware engine crew would normally be busy in port as most maintenance work was done when engines were not running. I was also aware that I would be losing valuable time as this particular ship was not scheduled and so I wouldn't know how much time I had left before getting off at a suitable port. Still, I thought it was best to settle in slowly and let people get used to who or what I was on this ship. The good news was some crew members (captain, engine fitter and chief cook from my previous ship visit; and the AB and 3rd officer with whom I had interacted on arrival) already knew or had a fair idea why I was here so they would spread the word - at least in the meantime. […] (Diary, 24th October 2011 [Day 2])*

[16] See explanatory note in chapter one.

I also found ship familiarization tours a useful way of "immersing" myself in this community during the first few days. I tried not to wander about the ship apart from the mess room for my meals and then back to my cabin until I had been familiarized by a designated officer:

> *Later that evening, 3rd officer rang to ask if he could take me on a familiarization tour. I slipped into my PPEs [personal protective clothing] and he showed me round the vessel. We began with the muster list covering alarm signals and bill duties. Then went to see the muster station and 3rd officer talked me through life boat and raft launch procedures. […] Then we visited the ship's hospital which was under lock and key, and the laundry facilities. I learnt that 2nd officer was the medical officer on board and so I figured out I could include relevant questions during the interview. […] We visited the officers' smoking room and 3rd officer bet that I would find the crew smoking room much more comfortable. When we got there, I met two crew members watching a recorded soap on TV and they gladly invited me to join in. We exchanged pleasantries briefly and I promised to be back. […] I asked to go out to the deck for some fresh air and we went round the ship. There was loud music from the gym and the cadets and ABs were having a good time. They were extremely friendly as we exchanged pleasantries. I immediately recognized those of them I had kept watch with the previous night on the bridge. […] [Diary, 8th June 2011 [Day 4])*

Once I had been taken through familiarization, I felt more comfortable to wander about the ship and indeed this was the point where I felt "accepted". Joining the ship itself was no guarantee of acceptance among the fold. On the one hand I had to try and keep up with the crew by doing much of the things they did. This took various forms including: having my meals together with the crew and spending their coffee breaks with them too. I also went about taking pictures on deck whilst they were at work having dressed in my own "work wear" (cargo pants, reflective jacket and appropriate personal protective gear). I sometimes spent night duty watch on the bridge with some of the crew. There were normally only two people at a time keeping watch on the bridge in the evenings. These were very quiet times and when people were most likely to tell you things:

> *I went to join steward in the makeshift TV room. We watched a recorded TV programme together with two other ratings. […]I learnt that we were due to arrive the DR [Dominican Republic] about 1600 hours tomorrow. Steward got me some water and I went up to the bridge to stay the shift with 3rd officer and his watch. […] 3rd officer told me deck fitter and 3rd engineer were signing off next port. […]Duty AB took interest in my research. He said he was happy to talk and offered to ring me whenever he was free. He told me he had been on board for 10 months and was looking forward to going home soon. […] He said most crew members didn't follow environmental procedures that much. And that only "mother earth" could "convict us". He argued that "people are different" and that it was a*

> *"mentality" problem. He said he will put in all the time needed for segregation of garbage but most crew members did not. […] (Diary, 28th October 2011 [Day 6])*

In the evenings, I joined the crew for beer, cigarettes, movies, card games and karaoke. The crew was predominantly Filipino so I took interest in their language "*Tagalog*" and often greeted and thanked them in this language. Other times, I tried Spanish which was a language they were equally familiar with:

> *I went down to breakfast and exchanged the new Tagalog words I had learnt with chief cook. I thanked him for last night's "pulutan" [pork skewers] and taught messman how to say good morning in my native language. He said it sounded Chinese and kept reminding himself as he tried to commit to memory: "njwe lah", until I left the room. (Diary, 19th June 2011 [Day 15])*

On the other hand, I had to try and stay focused on my role as a researcher or "control my participation" (Bogdan 1972, p. 28) so that I could make sense of things I had seen or heard during each day (Bernard 2000). This meant not drinking too much and knowing when to negotiate my leave or find time to jot something down. Initially, I scribbled notes on pad and then secured them in my combination suitcase. I later found using my mobile phone more convenient for producing "scratch notes" and less likely to arouse suspicion, especially in situations where I had to jot something down on the spot (Bogdan 1972; Sanjek 2001). I then retrieved them from the phone's drafts folder and typed them up on my computer, after which I deleted them from the handset. Luckily, my phone saved the notes in chronological order and with dates so I could conveniently type them up even after several days. I wrote sensitive and easy to decipher notes in French just in case anyone stumbled upon them. As I observed environmental-critical arrangements on board, I made notes about things I could not understand or thought I might have misunderstood (Bogdan 1972, p. 43); for example, about whether only one waste receptacle was provided in cabins (as it was the case in mine) and also where food waste was held:

> *Breakfast was truly English and I helped myself to some brown bread. And this time I had leeway to try and locate the bin for food waste. Yes it was the unlabelled bin!! However I didn't seem to understand why the label on one of the bins read "only rags & paper - No food waste pls!" and no one had bothered to indicate where the food waste should go then. I took a closer look and a label read "food waste only" but it wasn't on the receptacle – it was posted on the adjacent wall about a metre high perhaps for easy identification. (Diary, 6th June 2011 [Day 2])*

Whilst taking photos on deck, I observed some of the practices participants had told me during the interviews regarding how they complied with environmental requirements in their daily work. For example, I was able to visualize and make "headnotes" (Sanjek 2001, p. 35) around the following encounter:

> *Bosun mopped up an area which he had chipped prior to painting. He squatted and drove the roller slowly from side to side moving backwards as he progressed. Also, OS only took small amounts of paint at a time especially when he was working aloft [painting overhead]; and only small portions were being painted at a time. They used very small paint brushes – about the size of what I would use to season my barbecue – and very handy rollers. Another thing I noticed was that dust and rust from chipping had been collected in a pile on deck, perhaps ready for storage/disposal. (Diary, 17th June 2011 [Day 13])*

In general, observation in this setting took the form of "hanging out" (Lareau and Shultz 1996, p.3) or mingling with the crew in their daily work and life aboard the ship, listening to their stories, telling my own stories and consciously or subconsciously watching them do what they do. This meant developing a number of "continuity" strategies and taking on a variety of field roles which I have discussed further in chapter three of this thesis.

2.2.5. Analysing Documents

The third method chosen was analysis of documents. Atkinson and Coffey (2004) affirm that knowledge and understanding of how organizations work and how people fit into them requires some analysis of what records are generated in this process. Since this study sought to examine the impact on seafarers of environmental compliance programmes which shipping companies are implementing, I thought it necessary to sift through written procedures at the Company on environmental management and related documents. I was not allowed to take away a copy of the environmental management system (EMS) manual so I could only do a limited content analysis by working from a disc on an assigned computer at the Company headquarters.

Initially, I spent two-thirds of a working day at the Company office doing this. I first tried to understand the different environmental programmes and how these fitted within the overall Company procedures or management systems, structures and processes. I then went on to look at the contents (index) of the EMS operational manual itself to see if

specific areas of interest to my research had been covered. I also looked out for areas emerging from my field data: for example, personal waste, offensive and hygiene waste and waste from the ship's hospital. During follow-up meetings with managers at the Company, I further explored the EMS manual for risk management procedures concerning environmental protection-related tasks.

In studying documents within their social setting, the emphasis should not only be on how they are produced, but also about how they are used or function (Prior 2003). The main documents that were studied are:

1. Monthly Environmental Reports;
2. Master's Review of the Environmental Management System;
3. Company Risk Assessments; and
4. Company Injury and Near Miss[17] Reports.

Other (external) documents that were analysed include: manuals for the ship's incinerator and sewage treatment plant; fuel changeover booklet and calculator; and International Maritime Organization (IMO) and Protection and Indemnity (P&I) club guidelines for recording entries in the ship's oil record book. The manuals for the incinerator and sewage treatment plant were analysed for maintenance requirements and health and safety risks. The fuel changeover procedures and guidelines for oil record book entries were analysed for complexity and workload.

2.3. Analysis of Data

In this section, I will describe how the data was handled and processed to assist in analysis and interpretation. Analysing the data did not only involve shaping and managing the data to bring out meanings and to collate descriptions presented by my interviewees in a manner that answers my research questions (Rubin and Rubin 1995). But also, it enabled me to make interpretive sense of the data and to build explanations and arguments (Mason 2002). Indeed as I experienced it, it was an ongoing process which involved thinking about the data every step of the way (Blaxter et al. 1996).

[17] Hazardous occurrences.

I began the analysis by transcribing interview data. I found it very helpful to do it myself and sometimes as soon as I had finished conducting the day's interviews. The benefit of doing it in this way was that each interview informed the structure and design of subsequent ones, and I could easily remember any parts in the recording that were inaudible (Rubin and Rubin 1995). I found it important to ponder over each interview transcript in terms of how it addressed my research question and to identify early concepts or themes. This however required that I read my data in a particular way (Mason 2002). I found it helpful to read the data generated from my research more "interpretively" and "reflexively" than "literally" (Mason 2002, p.149). Reading the data literally was, nonetheless, a useful way of making a quick sense of the data or familiarizing myself with it. I then did interpretive readings to identify the accounts of my interviewees and how these compared with my own interpretations. Finally, by reading the data reflexively I was able consider my role in generating and interpreting the data collected.

The data set generated from the interviews I conducted can be described as a bag of data with themes embedded in them. As such I had to group and cross-reference the emerging themes which I identified in the processing of reading the data (Dey 1993; Strauss and Corbin 1998; Holstein and Gubrium 2003). I did this systematically across the data set to enable me to locate and retrieve portions of text for further analysis and cross-referencing for the purpose of answering my research questions (Mason 2002).

Processing the data in this way was laborious and repetitive. So I used computer aided qualitative data analysis software (CAQDAS) to make this task less demanding and to allow for flexible working and transparency in the research process (Fielding and Lee 1998; Mason 2002). However, I had to consider the time required for learning how to use this software package (Fielding and Lee 1998; Lewins and Silver 2007). Before collecting my research data, I completed an introductory training on CAQDAS as part of my research skills development plan. I was able to identify ATLAS.ti 6 to suit my needs and style of working and I spent time playing with the training data. During this time, I mastered the basic functionalities for navigating the software and learnt how to prepare my data for input into this management tool. I had checked that this software was available with the University and so I did not have to pay for a copy.

Once I had finished collecting my data, I signed up for a refresher session for ATLAS.ti so I could practise with the real data. I found this software package particularly advantageous for "navigating" my data because it was easier than working on paper-based

transcripts. For example I could locate codes and keywords I wanted to look up more quickly by simply using the search function.

2.4. Dealing with Risk in the Research

Perhaps the most important implication of the research relationship that I had with my interviewees was exposure to risk (Sampson and Thomas 2003; Sampson 2004). In the very early stages of planning my fieldwork, I felt that the subject of my research was not a sensitive issue which would impact on my wellbeing in the field (Sampson et al. 2008). Nevertheless, I did explore the potential for risk in all aspects of this research prior to visiting the ships. This research setting for active seafarers is probably one of the few exceptions for physical harm to researchers (Bloor et al. 2007). As in most offshore work environments, things such as installation characteristics and the general physical environment on board ships constitutes a health and safety risk for those who work and live within it (Parkes 2002). I identified specific physical risks associated with the hazardous nature of ships:

1. Injury or death due to collision, grounding, sinking or fire (ship);
2. Injury or death due to falls, trips, “man overboard” or drowning;
3. Sea sickness, starving or food poisoning;
4. Abduction by pirates or terrorists; and
5. Exposure to ambient conditions at sea and to hazardous chemicals on board.

I had also identified risks conditioned by my presence on board the ship:

1. Physical abuse from crew members;
2. Sexual harassment and sexual abuse; and
3. Racism, rejection, isolation or segregation.

Finally, I had identified risks associated with the reflexivity of this particular research design:

1. Listening to “their stories” could cause me to become distressed;

2. Disclosing my background and identity may produce role conflict or damage my personal image and career;

3. Interviewing can develop bonding and over familiarity with interviewees; and

4. I could leave the field with the "obligation" to address interviewees' plights.

To minimize the risk of physical harm from the research, I wore approved health and safety gear (for example, steel cap boots, gloves, reflective jackets, warm clothing, hard hats, hearing protection, etc.). I also took booster shots for relevant vaccines (Hepatitis A, B and Typhoid) and carried along relief tablets for sea sickness and sore throat. Events such as collision, fire outbreak or the activities of pirates and terrorists were clearly outside my control. Still, I decided that, depending on how much access I could get, I would try as far as possible to avoid boarding ships that will sail on very long voyages and on routes or between ports where such activities are prone. I also kept an agreed form of regular communication with my partner ashore so that they could tacitly determine when something might have gone wrong. This was facilitated by taking a satellite phone aboard the ship.

I was prepared to terminate the fieldwork if I experienced any form of physical abuse in the research setting. I was also going to report it to the competent authority and to my research supervisors. I was aware that in such circumstances it might not be possible to leave the research setting immediately as the ship may be underway. So I was going to ask to disembark at the next port of call. As far as emotional risks are concerned, I decided that breaking the interview would help relieve both parties of any tensions, trauma or other form of distress.

Whenever I took photographs of seafarers aboard the ships, I did so with their consent and shots were taken from behind or at a distance. Similarly, all photographs of environmental-critical equipment that were taken in the ship's engine room were done with the consent of the responsible senior officer and these were devoid of the manufacturer's label. Data collected was secured in the research setting by enabling password protection on my laptop, mobile phone and memory sticks. On board the ships, I stored all research material and equipment (including my dictaphone and camera) in my combination suitcase. I also kept my cabin locked at all times.

Finally, prior to commencing fieldwork, ethical guidance and approval was secured from the Cardiff School of Social Sciences (SOCSI) research ethics committee (see Appendix

8). In addition, I considered the British Sociological Association's (BSA) guidelines for best practice in sociological research (British Sociological Association 2002) and the Social Research Association's (SRA) code of practice for researcher safety (Social Research Association 2006). I equally took into account the Cardiff University code of practice and guidance on health and safety in fieldwork (Cardiff University 2009). I made note of the issues raised in the QUALITI-commissioned inquiry into the risks of doing qualitative research (Bloor et al. 2007) and attended a training workshop on "staying safe when doing research" as part of my research skills development plan.

2.5. The Pilot Study

In this section, I will discuss why I did a pilot for this particular study, and then explore how my experience of doing the pilot informed the research design and main study. Pilots are arguably less popular in qualitative research. However, where these have been applied in qualitative studies they have been found useful for exploring potential pitfalls in the main study (Oppenheim 1992; Blaxter et al. 1996) and for framing and refining research questions (Ball 1993; Kvale 2007; Turner 2010). Pilots have also been used by some qualitative researchers to test and refine research instruments (De Vaus 1996; Baker 1999; Sampson 2004; Bryman 2008) and to obtain background information for exploratory research (Hammersley 1993). For this particular study, I hoped that a pilot would afford me both an opportunity to try out my interview schedules and also to explore how I could gain access to interviewees.

As a first-time interviewer, I saw a pilot as a good time to "play" with the audio recorder and build the confidence I needed for using it (Hermanns 2004; McNamara 2009). Testing my interview schedules involved: seeing if they were suitable for answering my research questions; and also looking out for avenues to improve elicitation. I was particularly interested in identifying sections where the interviewee appeared to want to say more because I felt these would help me to improve upon the focus of the main study. To achieve this I had to read the interview transcripts at each stage and note what sorts of things were coming up in the data. Identifying these things enabled me to anticipate follow-up questions for similar ones recurring in the main study (Creswell 2007). I also had to make note of difficulties during the interview: for example, places where I was stuck or did not know how to continue; and instances where I received straight answers from

respondents. Identifying these difficulties was important for improving the flow of the questions in the main study.

Another reason why I did the pilot was to determine what participants would be suitable for the research (Creswell 2007). For example, whilst interviewing onshore personnel from one shipping company I found that interviewees could not credibly or extensively talk about the role of the company in ensuring compliance or indeed about changes in the company's environmental programmes. I later figured out that this was probably because this particular company had no comprehensive environmental strategy. I further observed that because of the very limited number of suitable participants for the Office Interviews, it was going to be very challenging to obtain qualified candidates. Finally, although I had been on ships before, this was going to be my first time going aboard as a researcher. Hence, I felt that a pilot will ensure familiarization with the "realities" of the shipboard environment (see also Sampson 2004).

I began the pilot in July 2010 with two shipping companies[18] based in West Africa and it lasted five weeks. In preparing for the interviews, I informed myself about the companies by visiting their website. I familiarized myself with information provided therein about what each company said it was doing about the environment. Throughout the pilot, I exercised the same rigour and discipline as I would for the main study. This was evidenced by how I managed the pilot exercise and also in terms of how I abided by the code of ethics and observed health and safety guidelines. For example, although the research access had been secured months ahead of the pilot, I still allowed company personnel adequate time to consider their decision to take part in the study. I made initial contacts to get to know the participants and to discuss the research and reassure participants about confidentiality. This was a chance for me to figure out how each company was structured and to identify the people in the organization whom I should talk to. It was also an opportunity for me to explore the shipboard side of the research, to confirm arrangements for boarding and to discuss health and safety procedures and requirements. I agreed tentatively on dates and availability and kept the possibility for rescheduling open.

I aimed to conduct no more than one interview a day and turned down offers from company personnel to be interviewed during times when they appeared to be having a tight schedule or in places where they had no privacy: for example, in shared office spaces

[18] The pilot experience reported here is based on company interviews only although it was originally intended to cover both company and shipboard participants. Reasons are advanced in this section.

at work (McNamara 2009). Some participants asked to be interviewed in the presence of their manager or other colleague whom they deemed more resourceful, perhaps because they did not feel confident enough to provide the required information. However, I insisted on conducting interviews on a one-to-one basis only for reasons of confidentiality. The realities of the field meant that it could take up to two weeks to arrange and conduct an interview for a shipping company official. Specifically, doing research in such a setting with a poor time management culture had a significant toll on the project timeline. People generally appeared not to know their availability and often offered to go on a day-to-day basis. Almost every company official I targeted during the pilot had the popular excuse of shipping being a 24/7 business. I remember having to reluctantly accept an appointment with a company official for the early hours of the morning (06am-08am) after several business hour appointments with them had failed. I also had a no-show during a weekend appointment from another participant who later denied having any such appointment during a telephone inquiry from their secretary. There was also the strange expectation not to arrive ahead of time or even on time. For example, I felt deeply embarrassed when I reported fifteen minutes ahead of one interview appointment and was asked if I were "British".

2.5.1. Companies in the Pilot

From this point on I will refer to the two companies I piloted as companies A and B. Both shipping companies were in the tanker trade and operating globally. Company A had been supplying crude to oil refineries in the region for about three decades. Company B supplied fuel offshore to vessels calling and operating in the region. Although there were about four people in Company A whom I had considered prospective participants for the research, I was only able to successfully interview two of them (General Manager and Chandler). The remaining two were: the Director who had asked me to liaise with the General Manager because of his busy schedule; and a former employee whom I finally dropped after three weeks of failed attempts to secure an interview appointment.

In Company B, I arranged interview appointments with the Station Manager and the Safety Officer. The company appeared to be concerned about the "security" implications of my ship visits as they had told me because their business was listed on the stock market. Therefore, it was not going to be possible for me to remain on their ships for several days. However, the company offered to arrange for me to visit their ships on a daily

basis for my shipboard interviews and I was going to be accompanied by the Safety Officer. I was also told in advance about the need to sign a disclaimer prior to visiting the company's ships.

2.5.2. Reflections on Field Approaches and Lessons Learnt

In general, I felt that the pilot interview data I collected did capture information on the actual practices of companies. However, the data did not quite lend itself to writing up anything about Company A's response to environmental regulation. After transcribing my first interview with this company, I was tempted to conclude that I would go away and revise my interview schedule to address this "deficiency". However, when I had finished with both Office Interviews for this company, I realized that this "deficiency" was not being produced by individual questions. After reading through the transcript of the second interview for Company A, it then seemed clear to me that the problem was not really with the research instrument. I also thought that it was not due to individual differences (in personal circumstances of both interviewees) either. Rather, my interview schedule appeared not to be helping me get answers for my specific research question (the company response to global environmental regulation) because this particular company had no clear environmental programme or strategy. I therefore resolved to improve the quality of data I was getting by refocusing my ongoing research access efforts on a more compliant company – that is one with a much more comprehensive and detailed environmental policy framework and strategy.

I observed that people were generally more willing to participate in the research during my initial meetings with them. They often opened up, asked questions about the study and readily provided information about what their company was doing about the environment. On my first visit to Company A, I was received by an officer whom I had been directed to and immediately, they began to tell me what they were doing about oil and garbage aboard the company's ships. They also offered to take me to one of their vessels on the same day and asked if I wanted them to arrange shore leave for a number of seafarers so I could have a chat with them about my research. The experience was similar in Company B where the managers also warmed up to me and briefed me about their safety management system and other environmental procedures in place. However, I did not pursue these offers form either company because I felt the obligation to strictly adhere to research protocols. For example, I would be in breach of researcher health and safety

guidelines by going aboard Company A's ships during an initial meeting. Similarly, by listening to too much detail from prospective participants during a preliminary meeting, I felt I would be losing valuable information which I could obtain more securely after taking their consent.

I would probably argue here that my health and safety considerations were in order. However, it seems to me that engaging extensively with prospective participants on the subject during a first meeting could have made them less nervous and informed them more about what I was looking to do. It would have afforded me an opportunity to win the confidence of prospective participants and also, to ascertain if a particular company was generally receptive to the whole research idea. What I did wrong was: focus on giving participants too much notice to decide; informing them about the research mainly through a sheet of paper; making notes on my interview log sheet and reminding them about their right to opt out. Perhaps I was a little too "professional" in my approach and I would think that most participants found this quite disconcerting. Maybe I looked like an "auditor" before them and this probably explains why subsequent appointments often proved difficult. They might have taken me "too seriously" and obviously this did not work to my advantage (see also Easterday et al. 1982). Again, I would think that I was generally not assertive enough in re-negotiating access and also placed little emphasis on "selling" the research idea to company officials, particularly in terms of how relevant my research could be for their company.

Nevertheless, there were a number of things that came up in the pilot data which I had not previously thought of. These had to do with Question 3 of the Company Interview (see Appendix 1). I had thought about sewage and garbage as key features of the likely environmental regimes which shipping companies would be subjected to. However, I had not sufficiently anticipated how ways of managing these aboard the ship might have unintended consequences for seafarers besides contamination. One participant explained that when the ship is docked, toilet and galley facilities were out of use to prevent pollution from the ship's sewage system. Crew members who are nationals of the port where the ship is docked are allowed to go ashore and use the port's toilet facilities while the rest of the ship's crew (non-nationals) are asked to remain aboard and are allowed only a limited use of the ship's toilet facilities.

At times when the system is all that small and maybe cannot contain the period of days that you stay in the dock…With a long stay when you tip something it will overflow. You don't use the toilet. You don't use the bath. […] At times we don't use it at all. See for example, on our vessel like this we have [local] crew on board and few foreigners [crew of other nationalities]. Um so maybe when they [are] in the dock [local]crew will not eat on board. They give them money to eat outside. You are getting my point? Same time you don't bath on board. There is bath house at the dry dock there where you can go and bath. But they will only allow the foreigners to bath on the vessel. (Cobra [Company A])

As this practice suggests a new kind of unequal access to shore leave for seafarers (see also Khaveci 1999; Sampson and Wu 2003) arising out of environmental management procedures for sewage in dry dock and in port, I felt the need to include questions in the main study to ascertain if seafarers were experiencing this.

There were also indications that procedures for garbage management involved some waiting time in port. One participant described the procedure as including: contacting the port's operations manager to give notice of disposal; the port operations manager then checks the volumes coming from the ship against the port's reception capacity before confirming whether disposal is possible.

So you can see, you can't just bring such a thing [garbage] without informing him [port operations manager]. Probably you will get there and then this garbage [receptacle] is full. It cannot contain what you are bringing. Of course you are going to litter around. So before you move you let him know. Even tell him the quantities that you are bringing for provision to be made for you. […] Of course you will have to wait. […] This waiting is um a span of a day, you understand. It doesn't go beyond that. (Samba [Company A])

Although the above participant appeared not to be concerned about the waiting times, I suspected that where such delays are significant they might, as a consequence, affect continuing operations aboard the ship with obvious implications for seafarers. For example, undue retention of some garbage types (e.g. domestic wastes and oily rags) on the ship can be hazardous for crew. Delays might also mean that ships do not comply and dump waste at sea because of severe waiting times. I was then in a position to explore these further by means of onboard observations during the main study. I could also probe for specific examples during Seafarer Interviews (see Appendix 2), particularly on questions about how seafarers felt company environmental programmes had changed the way they worked

(Question 6); and what they thought of company rules about the environment (Question 7). In addition, I was able to improve the way of introducing questions around these issues.

One final lesson I learnt from doing the pilot was the need to broaden the scope of Questions 2 and 3 of the Company Interview to include how companies implemented their environmental strategy across the entire supply chain. This was because of some emerging themes on health and safety risks that the activities of external actors could have on seafarers.

2.6. Summary

This chapter has considered issues regarding the research design and methods. It was argued that semi-structured interviews were most suitable for collecting data in the research setting for this particular study. Combining these with non-participant observation during the ship visits made it possible to contextualize and extend the analysis in a meaningful way.

The chapter also looked at how data were handled and processed, and the personal safety precautions that were taken prior to entering the field. Finally, the chapter concluded with an account of the pilot study which highlighted practical difficulties with securing access and recruiting participants, and how lessons learnt from it informed the main study.

CHAPTER THREE: RESEARCHING GREEN IN THE WORKPLACE

3.0. Introduction

In this chapter, I discuss how I put the fieldwork procedures into practice. Particular attention is given to my experiences and reflections on the research process. The chapter is divided into three sections. It begins with a description of how I recruited the participants and secured access to the research site. In section two, I describe the different roles I adjusted to in the field and reflect on their implications for my role as a researcher and for my study. The final section considers how I dealt with a number of safety issues in the field. The chapter concludes with a summary.

3.1. Choosing the Sample and Gaining Entry

3.1.1. Obtaining the Sample

Because this research seeks to explore the impact of corporate environmental compliance on shipboard workers by using a variety of data sources, a qualitative case study was used (Stake 1995; Yin 2003; Platt 2007). I considered doing a case study because I needed to understand the process of complying with environmental regulations and how the practices of shipping companies affect front-line staff (Sarantakos 1998). From my main and specific research questions stated earlier in this thesis, this case constitutes two units of analysis (Burns 2000; Baxter and Jack 2008). Firstly, it analyses a process – that is how shipping companies comply with environmental regulations at the shipboard level; and what factors influence their practices in complying with environmental standards. Secondly, it focuses on an analysis of the experiences of individual seafarers.

Case studies have been recognized as a useful way to provide detailed insight into phenomena that occur rarely (see, for example, Thigpen and Cleckley 1954; Goldthorpe et al. 1968) or those which often can only be studied within a real-life context (Yin 2009). For example, in social science disciplines such as psychology, case studies have helped to gain insight into a very rare mental condition (Elmore 2000) thereby increasing academic knowledge in this area and paving the way for developing treatment options for patients with the condition. Although using the case study method allows the researcher more flexibility in the research approach as well as yielding in-depth data from different forms of

data collection, case studies are not without prejudice. It is first of all this flexibility which in effect gives rise to concerns about the absence of rigour and systematic practice in the research approach amongst investigators (Yin 2009). For example, observation has been made by some commentators (see for example, Hamel et al. 1993; see also Merriam 2009, p. 52) about issues of representativeness, and that the absence of rigour in the conduct and analysis of case studies can lead to bias and subjectivity on the part of investigators. However, while decisions regarding the selection of cases to be studied have to be made by the researcher, "choosing the case well" (that is in order to achieve the best understanding possible) does mean balancing an attempt to achieve a representative selection with ensuring variety (Stake 2005; Flyvbjerg 2006; see also Miles and Huberman 1994; Patton 2002). Additionally, case studies have been criticized for producing rather limited samples and that the data only tells us about "the particular case" and in the specific context in which the data was collected. While such limitations might mean that the findings of case studies are much harder to generalize, even single case studies can in fact lend themselves to significant explanations (see, for example, Allison and Zelikow 1999; see also Flyvbjerg 2006). Indeed when doing a case study, the goal may well be to generalize analytically rather than statistically (see also Lipset et al. 1956), and the rationale is often that understanding a particular event will improve "understanding and theorizing" of several more cases (Stake 2005, p. 446; see also George and Bennett 2004).

Another argument frequently levelled against the case study method is that such studies take too long to complete and produce a plethora of documents. This is especially true, but nevertheless justifiable, of studies where data collection methods such as ethnography or observation are crucial for the form of inquiry. The data gathered using different methods and which may not always complement each other, when combined with a large number of variables of interest requires the researcher to cope with the challenge of building a picture of what the research seeks to measure (Yin 2009). As Stake (2005, p. 448) describes it:

> *The case study researcher faces a strategic decision in deciding how much and how long the complexities of the case should be studied. Not everything about the case can be understood – so how much needs to be? Each researcher has choices to make.*

Starting a case study means: "trawling around, scouting for possible places and people who might be the subject or source of data, looking for clues on how to start, and

the feasibility of it all" (Burns 2000, p. 464). In this case, I set out to interview on the one hand seafarers with experience of working aboard ocean-going merchant ships; and company personnel responsible for environmental programmes on the other hand. In relation to company personnel, I wanted to include senior managers and staff involved with the quality, safety, health and environmental strategy of my selected shipping company. I felt the need to include them because they are directly responsible for implementing company policies in this area and for taking actions to ensure compliance. I also included managers and staff in the more technical departments. However, the problem was with recruiting seafarers: at sea, in port, or during their vacation?

Interviewing seafarers in port would prove difficult. It would mean gaining access to the company first and then trying to figure out what port(s) the ship(s) would be calling at. However, because seafarers are often busy in port and ships do not stay long enough (see Khaveci 1999; Sampson and Wu 2003), I felt that attempting to collect data in this setting, especially through a semi-structured interview, may be problematic. Participants may be short of time so that I would be under pressure during the conversation (Hermanns 2004). Again, I thought I might end up having to do several ships (if the company in question had any more at all) in different ports or even missing out some ranks or positions. I figured there might also be some waiting time involved if I intended to track the company's ship(s) to finish my interviews. My preference therefore was to seek permission to board a vessel and sail with it.

I felt people would be more likely to talk in detail about their work practices if they were being asked about it in the workplace. And it is this kind of detail that I was after, and an opportunity to observe this in practice too. Furthermore, I felt that seafarers would be more relaxed during voyages at sea (see Khaveci 1999) and therefore very likely to open up and fully participate in the interview process. Again, my presence on board the ship during a voyage meant that I would be equally taking part in the work and life experiences of the shipboard community. I imagined that seafarers may as a result become even more willing to take part in my study. This decision on its own did not solve the problem as I had yet to figure out what company, how many ships, how soon and perhaps most importantly, how to get in.

Literature on global regulation in the shipping industry suggests that various workers on board the ship are likely to be affected by regulatory developments (see, for example, Sampson and Wu 2003; Alderton et al. 2004). For this reason, I felt it important to

attempt to include as far as possible all ranks and jobs on the ship. This meant interviewing everyone on the ship. Another reason why I considered interviewing all ranks of seafarers was because responsibility for implementing compliance programmes cuts across all shipboard levels.

3.1.2. Negotiating and Managing the Research Access Chain

Before fieldwork is done, one needs to consider how to identify and negotiate entry to the research setting (Hammersley and Atkinson 1995). Contrary to the impressions gathered from reading most accounts, negotiating research access is not always easy (Burgess 1984; Delamont 1992). In my own experience, gaining access to a shipping company and its ships did not begin and end with a simple agreement with the ship owner. Getting a ship owner or manager's consent was the first step in negotiating access. A total of eighteen shipping companies were identified through: internet searches; contacts and referrals during a high profile industry seminar I had attended with ship managers in Latvia; and recommendations from colleagues and friends. This took place between December 2009 and December 2010. I wrote formal letters to prospective shipping companies explaining the purpose of my research and exploring an opportunity to discuss the research further (see Appendix 3). Where it was not obvious whom I should address my request to, initial contact was established through telephone calls or e-mails which I sent out from my Cardiff University e-mail address to figure out the "gatekeeper".

In a few cases, I did get the companies writing back to say why they could not help (see Appendix 4) or sometimes pointing me to specific companies whom they thought would be in a position to assist with my research. For some of the negotiations, I had meetings and preliminary discussions with ship managers to establish feasibility and to assess if companies were receptive to the whole idea. This involved travelling outside the UK. Some of the difficulties with securing access during the very early stages of planning the fieldwork have been highlighted in the pilot study section in chapter two of this thesis.

I finally got a positive response from a UK-based ship owner who invited me to a meeting to discuss my research interests further. It was somewhat a relief that I had stumbled on a company which understood what I was trying to do, but I was still concerned about the impressions that could be conveyed through a face-to-face meeting with them and whether this would ruin my access altogether. For example, my research intentions

might be misconstrued by the company as an audit if I came across as such during a meeting. So I prepared to present myself as convincingly and assertively as possible and to create the right impact – whatever that meant (Shaffir 1991). Fortunately (or unfortunately) that meeting was cancelled and we continued to liaise by e-mail and telephone.

Re-negotiating Access

Although access for the main study was secured somewhere around September 2010, it took even longer to conduct the main study because of what I would term managing the research access chain. It was not until May 2011 that I began conducting interviews at the company; and June 2011 when I visited the first ship. The challenges of getting participants for Office Interviews have been described in the research design section of chapter two. However, the delays with joining the ship were largely due to unavailability of key office staff responsible for arranging my shipboard visits. Selected participants were frequently involved in a significant amount of overseas travel and training. I was often given very short notices for joining, and because of immigration restrictions, I could not reasonably obtain the required travel documents for joining within the notice. For example, on one occasion the company had asked me to join a ship in Malaga 48 hours before she was due to sail.

Other times, delays had to do with operational requirements. For example, on a similar occasion I was invited to join another ship in Montenegro. Because the ship was in dry dock for repairs, I had just enough time to get the necessary travel documents. But in the end, the company notified me a day ahead of my trip that I would have to wait for another opportunity because there was no room on board as a maintenance team had joined the vessel.

I understood that the company normally needed time to schedule my visits and that a proper planning of itinerary was needed to ensure that I got to the ship on time as the ships involved were mainly scheduled vessels. I also had to plan ahead for visas and joining in anticipation of the itinerary. Indeed I had to find the right kind of balance for sending out gentle reminders without jeopardising my access at the same time. And getting this balance right generally meant allowing reasonable time. My second set of Office

Interviews was delayed until September 2011 and the second ship visit did not take place until October 2011 for similar reasons.

Thus, the research access chain is often a long and seemingly endless one where access is negotiated and re-negotiated throughout the research process (Burgess 1991). First, there was the ship owner and then the ship managers or company. Then I had visa issues to deal with and even flights, time differences and clearing immigration to get to the ship. It was not a particularly pleasant task having to explain over and again to immigration officials from several different countries what exactly I was doing on each trip but thankfully, they seemed to understand in the end.

Within the company itself, I had to liaise with three different people who were in charge of arranging both my office and ship visits. This might sound as though I could always get hold of someone. Interestingly, there were a number of times when all three of them were out of office. Again, once I got on board I also had to try and establish rapport with the crew and get everyone on board know why I was there. As Bogdan (1972, pp. 16-17) suggests, getting in takes more than securing the consent of gatekeepers:

> *Different people in the organization have different degrees of receptivity to the observer, and although the gatekeeper may open the organization to him, he may be doing so against the will or without the knowledge of others, particularly those lower in the organizational hierarchy. Getting in involves more than getting permission from gatekeepers; it also involves contacting others and seeking their cooperation.*

Achieving this was by no means an easy task, not even in situations where I expected to benefit from “informal sponsorship” (Hammersley and Atkinson 1995). For example, it turned out that the captain (and two others) on my second ship was the same one I had met during my previous ship visit. I imagined things would be "safer” and much “easier" for me this time as we had already established rapport on the *Fair Winds*. So he would already know exactly why I was visiting the ship. And perhaps that being the most senior crew member on board, he would facilitate my entry. But it was not the case:

> *I went to see captain. I had left my door open so I could hear him coming and intercept him before he "disappeared" into his cabin again. He said he was busy. As with my previous ship visit, I had to allow time for even the most basic things as telling someone why I was here. I had been here for five days I thought, and had been trying hard to meet with captain. Of course I could have conveniently had the company “instruct” the captain to arrange my schedule and meetings for me but this easy approach might not be ethical as participation would not be deemed*

voluntarily. Also, it might damage rapport in the interview process and change the way participants would perceive me - e.g. more as company person. (Diary, 27th October 2011 [Day 5])

However, I did benefit from this kind of sponsorship from one rating who "knew" me from my previous ship visit and was able to spread the word:

I went to the crew mess room after breakfast. During my chat with 3rd engineer I learnt that sludge was going to be discharged soon. […] Chief cook and steward confirmed that they would be discharging garbage in Haiti too. All three joked about who should be interviewed first as chief cook suggested I speak to 3rd engineer first; while the latter suggested it was chief cook who knew the distances from shore [for garbage disposal] better. I learnt that there was a new schedule which would take us through three other ports (one in Dominican Republic and two in Venezuela) before returning to the Bahamas. I thought this was good time for me to complete my task - and so did chief cook who was already too familiar with my research routine. I told him I was going to "exempt" him as he had requested jokingly when I joined but that he would have to take me through the galley and garbage procedures for this particular ship. [...] (Diary, 27th October 2011 [Day 5])

Eventually, I had most crew volunteering to make time to be interviewed in the evenings. Others asked about the progress with my research and recommended when it was best to speak to whom; and in some cases even keeping track of who else was yet to be interviewed and chasing up appointments for me.

3.1.3. The Main Study

Data collection for the main study took place over a twelve-month period. I started off by doing half of the Office Interviews with onshore personnel before visiting the ships so that I could have a better understanding of what the issues were. For example, in one interview it was suggested that the galley department was the biggest offender when it came to waste and garbage management on the company's ships. In another Office Interview, a manager was concerned about engine crews' ability to cope with the fuel changeover regulatory requirements. So I aimed to ask crew working in the galley if they often got trouble; and to explore the fuel changeover process with the engineers aboard. I came off my first ship with a deeper understanding gained from actual practices on board and then, I could further explore the issues including new ones during the remainder. For example, I was able to ask onshore personnel follow-up questions about: the mixing of

cleaning chemical residues with other oily wastes in sludge tanks; the disposal of outdated pharmaceuticals; and handling of hygiene wastes on board the ship.

Prioritizing my research tasks in this way made the process of re-negotiating access even easier. For example, my visits to the office and contact with staff during interviews helped me build rapport with the company and win their confidence as they were now fully informed about what my research involved. After my interview with one of the managers, we had a chat about the research needs and my plans to visit the company's ships. In another interview, it turned out that the participant was directly responsible for getting me on the ships. So during a smoking break following the interview, we were able to explore things like where and when I would like to join against the ship's schedule and also visa requirements. Organizing my Office Interviews between the ship visits also worked quite well in terms of rapport during subsequent interviews at the company as people generally seemed quite pleased to see that I was aware about things they mentioned on the ships:

> *And you can see straight away that you know, we do take notice of the environment and the standards are set and you know, everybody knows exactly what the goals are; so the reduction in paper, reduction in printer cartridges - not only in the office but on board the ship as well. Things like that you know, um water. I think if you went on the Fair Winds you would have seen the sign on the bulkhead in the toilets saying: "Be very...something with water" huh? (Max [Onshore Personnel 7])*

One of the managers had suggested I should have "spent the whole week" at the office as there was so much to learn. Indeed, I had returned to the company on several occasions for follow-up interviews and discussions with managers. Follow-up calls were made for clarification and an e-mail contact maintained during the months following my completion of the company interviews.

By interviewing office personnel first, I found it helpful to learn and talk about the ship I would be visiting in advance: for example, about how she was dry-docked; how sewage was treated aboard her; and what sort of environmental-critical equipment I could expect to find on board that particular ship. I also got to know the ship's name and this enabled to me track her current position online and anticipate when and where I could join or get off.

The Sample

The sample of people who took part in the company interviews consisted of six men and one woman who were in full-time employment with the ship management company. At the time of the interview, two of the seven participants were senior managers and five were middle managers. All seven participants were British and they were recruited by purposive sampling. I was able to identify relevant positions by discussing with the company's human resources department what positions they had in-house and which of them would meet my research needs most. The final list we arrived at was based on availability. A total of 34 seafarers took part in the shipboard interviews. All seafarers on the ships were targeted but the sample was chosen based on availability. They were all males. The nationalities aboard the ships can be broadly described as British, Eastern European and Filipino (for more details of sample composition see Appendix 5). English was the common working language on board the ships and at the company headquarters.

Interviews with onshore personnel took place at the company headquarters. Interviews were conducted either in the participant's office or a meeting room was booked. On the ships, interviews mostly took place in the smoking rooms or on the bridge. There were only a few occasions where these were conducted in the participant's cabin or in mine. All interviews were digitally recorded with the permission of respondents. Only one participant asked not to be recorded and I took notes instead. I made notes in pencil on the original guide about things I would follow up on or ask along the line. This was done separately on each interview guide in relation to whom or what position I was going to interview.

Onshore participants were offered the opportunity to view their transcripts and make amendments. This was agreed on during negotiations for access with the company and I had ensured that only individuals taking part in the study were allowed this opportunity (see Appendix 6). I e-mailed transcripts in "private and confidential" especially as these were office e-mail addresses, so that they could not be forwarded or replied to in any automated fashion. I was concerned that people could be on leave and have their e-mails passed on to someone else. Similarly the opportunity was offered to seafarer participants to take digital copies of their own audio transcripts. However, only one participant wanted this. Taken together, interviews in the main study ranged in length from 21 minutes to 86 minutes and the average length was 49 minutes. The shore-based interviews, collation of documents and follow-up meetings at the company's office were

conducted over 8 days at intervals of several months. Observations lasted a total of 29 days at sea; 15 days on the first ship and 14 days on the second ship (see section 4.3 for a profile of case study vessels).

3.2. Being a Researcher: mirroring my field roles

I have discussed earlier in this thesis how my background might have influenced the choice of this project. However, there are situations where an individual's physically visible characteristics might affect their experience of fieldwork (Warren 1988; Cotterill and Letherby 1994). Being dependent on the goodwill of participants for interviews to take place often means being prepared to compromise on things like gender, age, sex, race, professional status, etc. (Cotterill 1992; Green et al. 1993). In this section, I will describe how I juggled the multiple identities which emerged as a result of my presence in the research setting (Warren 2001; Ramazanoğlu and Holland 2002) while establishing and maintaining friendly trust in my field relations (Hammersley and Atkinson 1995).

3.2.1. Being the "Expert" and being Green

During my interactions with participants I often felt the expectation to be familiar about the world I was researching. As Hermanns (2004) describes it, I sometimes felt tempted to protect my reputation by choosing not to ask follow-up questions that may be necessary to elicit the life-world and knowledge of the participants or indeed which may be relevant to the research problem; or even to pretend to know something that I did not. For example, in one interview a participant was trying to guess when the international safety management (ISM) code came into force. I had suggested a date and it turned out to be wrong:

> *No before that, before that... 1995 something like that, so it's [pause] and it's a quality system for shipping and it… so you know about the ISM? (Harry [Onshore Personnel 1])*

Another participant had asked me what annex contained garbage management procedures in the MARPOL handbook as he flipped through it. Interestingly, as an "expert" I was not

only expected to know but most onshore participants did actually tell me at the end of the interview that they had "learnt a lot" and that I had "got them thinking".

I also felt the obligation to be a good example for others or to "practice what I preached". This meant being "green" or at least being seen to be "green". I tried to demonstrate awareness and respect for company policies especially the "environmental" ones. For example, during my office visits I was shown to the kitchen area and I made sure I cleaned and returned my crockery (I had been offered coffee and a sandwich) and disposed of waste appropriately (correct bins). Most times I went into the kitchen, there were people around and I did not want to be "caught" doing the wrong thing. I also made sure I switched and powered off the computer before leaving my desk at the end of each day.

The expectation to be "green" did not end at the office. On the ships, I took my crockery to the pantry myself and disposed of left overs in the appropriate bins, sometimes under the watchful eyes of the crew:

> *As I cleaned my plate in the pantry, messman and I joked over where the paper should go. He had told me during the previous evening how much paper people had put in the food waste together with their food. Messman had also taken me to see the mix of paper and food waste in the pantries last night. I felt the expectation to be an example since I had interviewed him on the subject. (Diary, 13th June 2011 [Day 9])*

However it was not always straightforward and occasionally things did go wrong too. On one occasion, I mistakenly disposed of a prohibited item into the ship's sewage system. On another occasion, it was not clear what I should do with my food waste:

> *I went down to breakfast hoping to get a bin bag on my way back. But I forgot. So I had to improvise in the meantime. There was a shopping bag in my backpack so I chucked my used tea bags and other rubbish into it. I had bread and poached egg for breakfast. […] I took my leftovers (bread crumbs) and plates to the pantry. I found paper and food waste mixed in a receptacle so I decided to put just the paper in. There were no other receptacles on site - at least as far as I could see today - so I left my bread crumbs in the plate by the sink. I heard messman thank me on the other side of the galley and I thanked him back. […] (Diary, 24th October 2011 [Day 2])*

Being a good example was not only limited to my research interests but also about how I dressed (Shaffir 1991). I made sure I had the correct personal protective clothing at all times. The following extract from my diary shows how I tried to look "safety conscious":

> *I joined the MV Fair Winds about 7 hours before she was due to sail. It was quite a ride to the port from my hotel and I was lucky to have the ship Agent pick me up. We drove through the port police barrier and once we had cleared port security, where I had my passport checked, the Agent dropped me off at the foot of the gangway where I quickly changed into my PPEs [personal protective clothing] (of course I already had appropriate footwear on!!). It was windy and I held onto my helmet as the vessel was loading containers right above us. […] The gangway was quite shaky and I held on tightly not minding the sticky black grease on the hand rail. (Diary, 5th June 2011 [Day 1])*

On leaving the ship, I took a similar approach but surprisingly, the ship Agent accompanying me had asked me why I was wearing a helmet. I noticed he was not wearing any PPEs – not even foot wear – and I pointed to the cranes working the containers above us.

3.2.2. Being black, powerful and "hustling"

I did anticipate that my presence in the field might be construed by shipping companies as a "customer" (Venkatesh 2002), where I could be asked to provide services like: feedback on the activities of their workers aboard ships; advice or opinion on environmental, operational or crewing issues; and indeed training opportunities for their workers. Although I did not experience any of this, there were instances where I had to manage and prevent this from happening. For example, during the Office Interviews, one participant jokingly enquired if "tool box meetings" were held on a ship I had visited in response to a question which I had asked:

> *In all my times I have been doing inspections on ships, both whilst I have sailed on them and actually worked on them, I have never seen any chippings or waste material dropped over the side. […]During the tool box meetings in the morning - did you have any tool box meetings on the Fair Winds; did they do any? You'd have to tell us because then I'll get on to the captain and say "I have been informed by a reliable source that you've been doing this on board this ship." [laughs] (Max [Onshore Personnel 7])*

Fortunately, we had both laughed about it and no answers were expected from me as participant confidentiality was understood to apply across the board.

There were, however, occasions where I felt that my identity had been reconfigured along ethnic lines (see also Venkatesh 2002; Oriola and Haggerty 2012). Being

a black African from the poorer part of the world, my encounter with participants of similar origin caused them to want to view me in their own circumstances. For instance, seafarers normally live and work away from home and many are motivated to do this because of the need to secure a livelihood for their families. Because I was a research student studying and living in the UK, and perhaps even through the very activity of collecting data aboard ships, I was sometimes misconstrued by this group of participants as being in pursuit of a similar economic goal:

> *2nd officer had said: because I had "asked him questions" [interviewed him] he also wanted to "ask me questions". He enquired about my salary, employer and what I will be doing after my research. I explained to him that I was a student and that I was going to have to find a job when I finished. He wanted to know "what kind of job" and I replied that the opportunities were varied. He seemed not to understand that someone or perhaps someone like me would be doing this sort of thing for a purely academic motive. He struggled to make connections between the ship owner and myself, and I told him Cardiff University didn't own ships and that I was not a seaman. He asked if I was going to be paid for the research, etc. I explained that as a student I only got a stipend to help me survive in the UK. He seemed satisfied as he believed that I wouldn't have survived without that support. He wanted to know how much money was involved and I quickly changed the conversation. (Diary, 11th June 2011 [Day 7])*

Other remarks were also made relating to my race but this time suggesting I was a "powerful" person on board:

> *Oiler had said during the birthday soiree that I had "more knowledge" than most of "the white people here" and that my skin was "already fair" too as I had "lived in the UK" for a while. And I replied that perhaps I just needed to "cook" my hair to make it complete. [...] He told me how better he could perform his duties compared to the Eastern European crew on board and that the only barrier was his race. He "advised" that "we" [and I guessed underprivileged races] had to be proud of "ourselves" and be self-confident. […]. He talked again about "being black" and "being superior". When he learnt that I was still trying to get the engineer officers for my interviews, he said "…they are afraid to speak to you because they are used to being up there and now someone has to be up there and they down there". He also added that it might be due to language barrier as they might not want to "embarrass" me. (Diary, 11th June 2011 [Day 7])*

This view was reinforced by another participant who felt I was a go-between or perhaps the "untouchable":

> *During the rest of our tour, 3rd officer really began to open up to me. […]He told me that being "the owner's special guest", I was entitled to beer, wines, spirits, tobacco, snacks, etc. which my cabin was due to be stocked with once we had left port. He said they as crew had to pay for it and that it was deducted from their wages. When I enquired if he had arranged for me to speak to chief engineer or 2nd engineer, he went on to say that unlike the rest of crew, I could speak directly to captain whenever I wanted and that if I needed anything "with immediate effect" from the other senior officers I should simply go to captain. He said: "Sometimes I go for days without even seeing or speaking to captain. But you as the owner's special guest, you can speak to them anytime; if you want anything just go to them." […](Diary, 8th June 2011 [Day 4])*

I later learnt from this participant that throughout his career he had never seen a researcher on a ship. He told me the rest of the crew felt the same and that they were excited to know why I was here and what my research was about. I enquired if they were nervous or worried and he seemed to agree. Immediately, I realized that I had extra work to do towards defining the boundaries between the owners, the managers and myself.

In general, I felt an extra responsibility for balancing power relations in the research setting so I could effectively check that research participants did not "control the outcome and analysis of the research" (Skeggs 2001, p. 434). I became concerned that interviewees may feel under obligation to participate perhaps out of fear of offending their employer or losing their job and may then resort to self-censorship (Reinharz and Chase 2001). I found taking complimentary copies of SIRC[19] annual reports on board useful for ensuring that participants were reassured about the very purpose of the research and what the data collected will be used for. For example, crew often came to me saying that they had seen my picture and names of some of their fellow nationals doing what (similar research) I was doing. On that basis, I could then expatiate on where my own research fitted.

3.2.3. Managing Role Conflict and Ethical Considerations

I had anticipated participants could have issues relating to their welfare on board or family life, and may need various forms of support. This then led me to reflect on what social research considers "appropriate" when it comes to providing help for respondents (Owens 1996) or perhaps how to avoid being drawn into situations which leave researchers

[19] Seafarers International Research Centre.

with the obligation to intervene or even a dilemma (see Pithouse 1996). To minimize role conflict, I took with me on board contact details of the relevant agencies (for example seafarers' missions, port chaplains, trade unions, etc.) handy to refer my interviewees to if need arose. On my part I tried to be clear about what my research will and will not do, to release myself from the "obligation to reciprocate" gatekeepers and participants. For example, I had learnt from one participant that he was being "bullied" by his supervisor:

> *[…]He told me the other officers in the department made his work difficult for him and whenever he complained nothing was really done about it. He said they sometimes mixed garbage in the engine room, e.g. metals with oily rags and other waste, and that he was not happy about having to be the one to sort it all over again. He felt there was a "mentality" problem and that some people simply "didn't care". He said they sometimes threw oily waste into the sea at night and even things like metals and wires: "…because they are heavy you know, they will not float". I asked if he was part of this practice and he said "what can you do? They are my superiors", and then he added that sometimes he pretended to obey but disposed of it within the guidelines. […](Diary, 11th June 2011 [Day 7])*

I had told this participant that there was not much I could do about his bullying experience at work but that he had to take it up with his superiors as was the norm (which he said he already had). I had also referred him to the company's "speaking up policy" which was posted in the smoking rooms.

People also generally complained to me, usually during the first few days, about things like there being no internet on board; long contracts; and that the entertainment system on board was broken. In most cases, I knew there was nothing I could do about anything but I had to try and keep morale on board in the best interest of my research goals. Trying to balance this marginal position of being a "stranger" and a "friend" was imperative for getting on in the field (Hammersley and Atkinson 1995). I did a number of different activities to "keep 'even' with the Joneses": singing during karaoke evenings; watching movies in a language that I did not understand (and sometimes adult content); drinking heavily and smoking; fishing; and even concealing my valuables so as not to look too "different" from the rest:

> *I joined steward and Filipino engine cadet in the make shift TV room. Chief cook and deck cadet later joined us. […] We had several shots of brandy, cigarettes and the expired coke while awaiting departure which was due at 0200 hours. Some pulutan [pork skewers] and sushi was also served. […] I ate with my hands to deck cadet's delight. […] (Diary, 29th October 2011 [Day 7])*

I did not wait to have my cabin waste taken down for me and I always took my crockery to the pantry after meals. I dressed to “blend” into shipboard work life and to “identify” more with the crew (Bogdan 1972, p. 30). Whereas this meant being selective about what wardrobe to take on board in the first place, I nonetheless had to explain to airport security in Caracas on my flight back to the UK why I was carrying a hard hat, flame-retardant suit and hearing protection in my suitcase.

Being respectful and overly polite at all times was another way of getting on in the field. Thus, even when I had been given “authorization” to do something, I still aimed to give others due respect and to “tolerate” whatever they said to me. For example, because I had difficulty recruiting one participant, and also considering that he was much older and a senior officer on board, I tried not to approach him in a way that would make him feel “inferior”:

> *I went down to engine room to see chief engineer. I put on my PPEs and asked engine cadet to walk me to control room. When we got there I greeted chief engineer and he replied: "What are you doing in the engine room? You are not supposed to be in engine room it is violation of ISM Code so go back…" And I told him I only wanted to know when he would be free to talk to me and that I was aware I was a risk to the engine room and that was why I didn't barge in unsupervised. […] And then he enquired "But what do you really want to speak to me about?" and then I squatted in front of him as he bent over me from his swivel chair and I explained to him the purpose of my research and the need for observation and also permission to take pictures (although I already had this from Captain). He told me he was pressed for time and that they were only going to do oily water separation the following month and that incineration was going to be the following week so I could observe these. He enquired "what else?" and I told him we needed to have a discussion around some environmental topics. Then he asked "Do you have like a questionnaire I can go through during my free time..." and I explained how it was meant to be. We agreed on time and he smiled saying "I hope we can do business then" and I replied "Yes you are the main environmental person in the engine room and that is why I have come to you". He offered me a sit and got 4th engineer to show me round so I could take pictures. […] (Diary, 12th June 2011 [Day 8])*

Similarly, during an interview I felt like clarifying what I had meant by "concluding remarks" for a participant who was a non-native speaker of English because I had felt embarrassed by his interpretation:

> *At the moment so...conclusions. No, at the moment nothing. Because normally all decisions, all conclusions is based on some situation. I don't know I just can't think about something. Anyway, every decision, every solution must be exactly procedures; must be like algorithm. So I think. I am not the author of some story*

book so at the moment I think for this job [environmental management], there is special organizations, special people who are thinking about this, who make analysis, statistics. So they do better. I can make some decision but on my small vessel in some situation. But for environmental management I am a very small person at the moment. (Ken [Deck Officer 4])

There were also times when I felt that being in the research setting was inflicting psychological harm on myself (Marshall 1994). Actually, one participant had told me they understood how difficult it must be for me to remain on a ship especially when I had finished what I was doing and given that this was not a “passenger ship where I could relax” with all the amenities. He said we were "restricted" in terms of ports at which we would be calling and the crew on board, so I would really be bored as there was nothing new to see and because I was already familiar with everyone on board. Other times, it was simply the frustration of not being able to get to speak to some participants who had said they were “busy all the time” even after nearly two weeks of “courting” them; and others who deliberately avoided me.

Indeed getting on in the field and carrying out these different activities made me feel relatively powerless. I felt that by “doing niceness” I was performing “emotional labour” because I was trying to be what I was not so that my participants could be who or what I wanted them to be (see also Hochschild 1983; Kleinman 1991). This went on repeatedly and throughout the fieldwork because of the existing power relations as I have described, and hence the need to re-negotiate access over and again (Burgess 1991).

3.3. Staying Safe Aboard

This section considers the strategies I adopted to remain safe when I was doing research aboard the ships. It turned out that one of the ships I was due to visit was trading in an area where the risk of kidnap was known to be very high. As I made preparations to join this ship, there was an e-mail update from the University finance office confirming that the place I was travelling through was an “excluded area” for coverage on this type of risk. Again, I had read news reports that a vessel belonging to the company's Group fleet (but not being managed by this particular company) had been detained for carrying drugs and that the crew were being held. I had also read about similar incidents involving ships of other companies that had occurred earlier in the year. So I updated my risk assessment

accordingly especially keeping in mind that this trading area was a hub for drug trafficking. In matters like this, everyone on board would be detained and hence the risk of me being caught up in someone else's war. I made a similar assessment for the risk of smuggling as it might be assumed that I could be an easy or a convenient channel for this.

Strategies to minimize both types of risk included things like: staying locked in my cabin when the vessel was in ports with known risk of kidnap or abduction; only using transit and accommodation approved by the ship Agent for joining or leaving the vessel in such countries; maintaining contact with ship Agents while ashore in foreign ports; not getting off unnecessarily in foreign ports; keeping cabin locked at all times; not wandering on deck unaccompanied or when crew were not working on deck; not purchasing, carrying or keeping things on behalf of the crew; and keeping a low profile.

I completed a health and safety questionnaire (Appendix 9) each time I planned a ship visit. The company required me to provide evidence of medical fitness and so prior to each ship visit, I had my doctor examine me to confirm in writing that I was fit to travel. Although I was privileged to have undergone health and safety training as part of my mandatory pre-sea qualification, I only considered this training as supplementary. I abided by company health and safety policy on board and followed all relevant prescriptions. For example, on one of the ships there was a fire drill and I made sure I took part by reporting at the designated place promptly and in the appropriate clothing. Every time I went out on deck, I made sure I had my reflector jacket, safety boots and hard hat on, regardless of whether or not other crew did the same. I took similar precautions for engine room observations:

> *Interview with chief engineer went quite well. He was very chatty and agreed to show me round the engine room after the interview. I wriggled into my boiler suit and followed him. […] Chief cook and steward gave me the thumbs up for my boiler suit. Chief engineer introduced me to his team and then checked that I had hearing protectors. He had his on but he wasn't wearing a boiler suit. He told me the control room was the "heart" of the ship and sometimes it had "heart attack". He walked me through the relevant environmental-critical equipment and several others (purifiers; fuel and diesel, sewage treatment plant, oily water separator, etc.) and I took pictures. I often checked if a railing was wobbly before leaning on it to take photos or holding onto them to keep my balance. And indeed one of them was. It was hot in the engine room and very noisy too. Back in the control room, it was less noisy so we could talk. (Diary, 29th October 2011 [Day 7])*

I had arranged to maintain contact ashore (see Appendix 10) throughout my ship visits. However, using the satellite phone was very tricky. There was often no signal from the cabins so I normally had to go up to bridge where people were working to be able to use it. Each time I did this, I pondered about how I could possibly use the phone without someone seeing me, particularly if there was an emergency arising from within the ship itself; for example, hostility from senior officers:

> *I had gone up to the bridge last night for signal to use my sat phone. AB was on watch and enquired if it was "my company" paying or myself. I asked if they made calls back home and he said they had SIM Cards at $20 for 19 minutes supplied by the company and deducted from their pay. He said they only used them for emergency. He showed me the phones and the price list. (Diary, 11th June 2011 [Day 7])*

Again, I mainly placed calls instead of using the text messaging feature on satellite phone. I did this partly because I was concerned that this would raise a false alarm in the event that my text messages didn't go through. This could damage both the access and rapport I had worked hard to build thus far. The other reason why I did this was because the only way I could receive replies to texts which I had sent out was by calling the network provider's voice mail. And just by the way, I had figured from my bills that calling the operator's voice mail was far more expensive than placing calls to a non-satellite number such as my contact ashore.

Finally, it was quite challenging to take nondescript photographs of people whilst they worked. This meant trading-off quality or focus of the shots because most crew were wearing company branded coveralls. People also tended to "pose" whilst I tried to shoot and others kept asking why I did not want to do close-ups. So I had to explain to them over and again and I felt relieved that they had understood me. Almost everyone I shot did not really mind about close-ups or being photographed at all and most were quite happy. I also had to "think (and do) safety" while shooting:

> *I went out to the deck to take photos. […]I enquired from Bosun where people would be working on deck and he pointed me to the places and told me what kind of work would be going on there and who had been assigned. […] Some areas were covered with fresh paint and dust and rust was in the air. It was also very noisy in the chipping and welding areas and there was water dripping and splashing and cables crossing where British deck cadet was taking readings from reefer containers. […]Back in my cabin, I checked my hair and body for any paint stains and then freshened up. (Diary, 17th June 2011 [Day 13])*

3.4. Summary

This chapter has described my experience of conducting field research. The discussion has highlighted the challenge of negotiating access for research of this kind. The sample was described and events in the main study have been discussed. Notes have been drawn from my research diary to illustrate and illuminate ethical issues and safety considerations around conducting fieldwork aboard ships from my own experience and feelings.

The reflections provided in this second methods chapter also serve to emphasize some of the difficulties I encountered with getting participants to cooperate in the research. The implication of such field challenges, which I return to later in the limitations of this study, is that I could have uncovered more about the ways in which work at sea had been affected through environmental compliance by being able to secure the cooperation of as many seafarers as I would have wished.

The remainder of this thesis will consider the data analysis and interpretation. Chapter four describes the case study. Chapters five, six and seven present the findings, and in each of these three chapters, the analysis is based on the perceptions of shipboard and shore-based participants. To a lesser extent, reference is made to diary entries from my field observations and documents.

CHAPTER FOUR: THE CASE STUDY

4.0. Introduction

This thesis explores the practices of shipping companies in complying with environmental regulations and how these impact on seafarers. The research contemplates whether carrying out various environmental protection-related tasks on board the ship has had any unintended consequences for seafarers, particularly those relating to their wellbeing in the workplace. In the following three chapters (chapters 5, 6 and 7), I will present the findings of my research which is based on the case of one ship management company. These findings aim to illustrate the extent and manner in which companies are complying with environmental regulations at the shipboard level. They further attempt to highlight the ways seafarers act in relation to company procedures and legal requirements for protecting the environment on ships. However, as a foundation for understanding the results of this study and the implications thereof, it is important to first introduce the case study.

This chapter presents the case study, hereafter "Taf Shipmanagement" or simply "the Company". In order to give context to the discussion that will follow, the Company will first be located in the container sector of the shipping industry. In section two, the Company's profile, structure and regulatory compliance history will be examined to highlight its standards of environmental compliance. In the third section, some key features of the Company's two container ships which constituted the research setting for the seafarer interviews and ethnographic observations will be presented. Section four describes job responsibilities on board the ship in general. The final section of this chapter provides an overview of the Company's Environmental Management System (EMS) to illustrate the general roles and responsibilities of managers and seafarers in implementing legal and other requirements for managing ship-source pollution.

4.1. Container Shipping in Seaborne Trade

The container or box sector specializes in the carriage of dry cargo in homogenous units. Box shipping or unitization as the name implies, involves moving goods in unit loads stacked on cellular guides. Hence, the carrying capacity for container ships is measured in

twenty-foot equivalent units or TEUs. Container systems were first introduced in the 1960s. Despite the huge investment required to establish the container industry and the associated loss of jobs for dock workers, the benefits have been far-reaching. This is evident in quicker transit times, lower freight costs, and seamless links with other modes of transport such as road and rail (Levinson 2006).

Containers have since developed from boxes which carry traditional break-bulk and packaged cargo, to more sophisticated designs that allow for the carriage of bulk liquids and gases (in tank containers) as well as refrigerated cargoes. Container systems have also been a driver for developments in port technology. Most modern ports are specially-built with mobile gantry cranes for handling units to and from the ship, and across terminals. For this reason and those of economies of scale, bigger container ships tend not to have their own crane[20]. The trading region for such ships is thus restricted by port facilities not only for cargo handling but perhaps more importantly, by port physical conditions for the particular vessel's draft requirements. Ports can only accommodate bigger vessel sizes if there is adequate water depth at the berth and in the access channels. A number of such larger ships, known as post-Panamax vessels (15,000-18,000 TEUs) are expected to be delivered in 2014 (UNCTAD 2011) and existing ports will have to adapt to handle these much bigger ships. Bigger ships are designed to carry even more crew on board, with the latest generation of post-Panamax vessels carrying up to 30 crew (see Leach 2011).

The demand for container shipping is closely linked to growth in world trade. In 2010, the volume of world merchandise exports increased by over 16 per cent. World seaborne trade grew by 7 per cent in the same year with container trade accounting for most (about 16 per cent) of this expansion (UNCTAD 2011). Container trade volumes grew by just under 13 per cent in 2010 reaching 140 million TEUs. The share of container ships in the world fleet also reflects the growing demand for seaborne trade of manufactured goods which make up the core of goods shipped in containers (over half of merchandise exports by value). Today, container ships make up 13 per cent of the world fleet up from 1.6 per cent about thirty years ago (UNCTAD 2011).

Growth in container ship size has been largely driven by increasing concentration in the container sector (see also Clark et al. 2012). Mergers and acquisitions in the liner shipping industry during the last half decade have improved the market share of the top 20

[20] Even those ships with their own crane tend to go for shore cranes in ports where these are available because of the faster handling rate.

liner operators to nearly 70 per cent TEU capacity in January 2011. Further consolidation is anticipated in the future and this could see the number of global carriers reduce to about ten box lines (Porter 2012). Liner shipping is a complex network of regularly scheduled services across the globe. At each scheduled destination port en route, the container ship is unloaded and loaded up again straight away before beginning its onward journey to the next port of call. Each rotation on the schedule is known as a voyage and on very busy trade lanes it could be a matter of hours between port calls. Container traffic flows are significant on major East–West trade routes namely, Transpacific, Europe-Asia and Transatlantic trade routes. Accordingly, the journeys that liner ships most often make are between Far East countries; between the Far East and Europe; between the Far East and North America; and between Europe and North America.

In the past decade, liner operators have found hiring container vessels from third parties more attractive because it reduces the amount of capital tied up in spare capacity and increases flexibility for a trade where time and reliability is of the essence. The existence of such flexible trading arrangements and the prevalence of market concentration are among some of the features of container shipping which add to the complexity of business relationships making it an interesting case to explore for regulatory compliance (see also Clark et al. 2012). Various forms of contractual agreements can be concluded and the terms are normally governed under a written document known as a charter party. Some of these agreements can be one-off or may not necessarily involve a scheduled service (see Stopford 2009). As will be highlighted in the following two sections, the Company's container ships were operating under two different arrangements.

4.2. The Company: Taf Shipmanagement

Taf Shipmanagement is a UK-based subsidiary of a global ship owning and management company (pseudonym – *Taf Group*). *Taf Group* employs about 17,000 sea-going and onshore personnel and has a total fleet size of over half a thousand ships. The Group has shipping operations in many countries worldwide and *Taf Shipmanagement* is one of them. At the time of conducting this study, the number of ships managed by *Taf Shipmanagement* was more than five per cent of the Group fleet; and the number of seafarers employed made up about three per cent of Group staff. The Company's ships are

flagged with both traditional maritime national flags and flags of convenience[21] registries. Table 1 presents a profile of the Company's fleet[22].

Table 1 : The Company's Fleet Profile

Liquefied Petroleum Gas Tanker	*83.3%*
Chemical/Oil Product Tanker	*11.1%*
Container	*5.6%*
Flag	Bahamas, Cyprus, Indonesia, Isle of Man, Liberia, Singapore, UK
Trading region	Worldwide
Size (gross tonnes or GT)	3000-18,000
Age (years)	0-24

Source: EQUASIS[23]

Taf Shipmanagement's business is mainly driven by the gas tanker market and containers come in third place, making up about 5 per cent of total fleet under management. Customers for the Company's tanker trade include oil majors and chemical companies, and its container vessels are operated by liner shipping companies. In a way, it can be argued that *Taf Shipmanagement* is not typical of most container ship operators because it is mainly involved in the transportation of petrochemicals – a sector where commercial value is placed on environmental (and safety) compliance standards by the charterer[24] (see also Walters et al. 2011). However, considering that the Company's container ships were on hire to major and reputable container ship operators, it may well be considered to be typical in this tier of the container sector.

[21] Flag of convenience is the term for national flags of those countries with whom foreign ship owners register their ships for economic and/or regulatory reasons. See also Bergantino and Marlow 1997.

[22] The distribution of ships in the fleet is expressed in relative rather than absolute terms for confidentiality.

[23] EQUASIS is a public web-based information system which publishes safety-related information on ships from both public and private sources. See also EQUASIS 2012.

[24] An organization that enters into a contractual arrangement with a shipping company to transport cargo or to hire a vessel for private use.

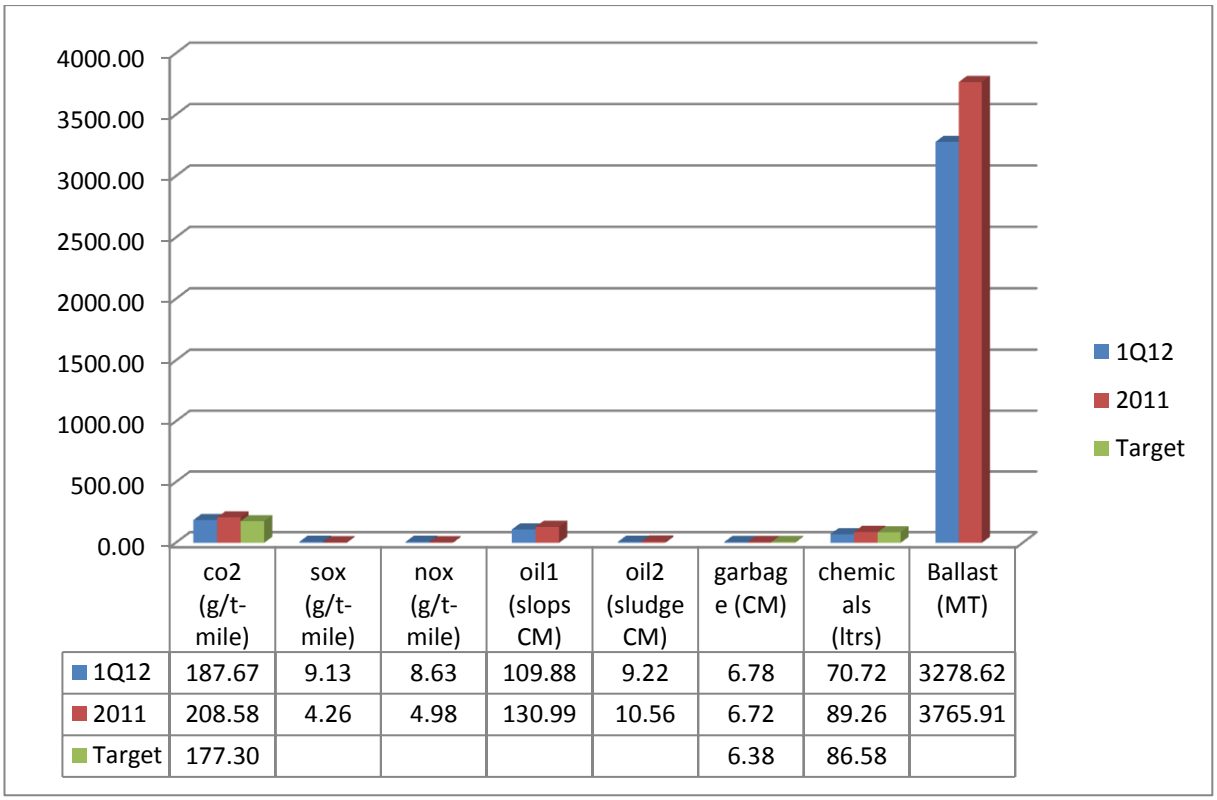
The Company's ships traded in different parts of the world. Its container trade spanned the Atlantic and Mediterranean regions. At the time of conducting this study, the youngest vessel in the Company's fleet was less than a year old. The average age of ships within the fleet was just over 11 years or 8 years younger than the global average age for the world's cargo carrying fleet (see IMO 2012).

About 70 per cent of the Company's ships had Class[25] certification from a reputable assessor (International Association of Classification Societies or IACS member). As an international safety management (ISM) Code manager[26] for all ships in its fleet, the Company had complete responsibility and authority for monitoring the pollution prevention aspects of the operation of these ships and for providing relevant shore-based support.

During informal discussions with managers, I was taken through the Company's environmental monitoring and reporting system which was largely based on data collected from each of the Company's ships on a monthly basis. The statistics measured emissions and effluent generated by each ship and covered a number of other environmental performance indicators. For the purposes of this study, the Company's environmental footprint will be described only for those shipboard activities identified by *Taf Shipmanagement* as causing significant environmental impact (refer to section 4.5.3 later in this chapter). The data presented in this respect has been drawn selectively to highlight environmental performance in a number of key areas regulated under international laws addressing pollution from ships. Figures 1 to 3 in this section are based on average year-to-date data for 2011 and for the first quarter in 2012. The data for the latter period reflects a 5.6 per cent growth in fleet size or improvement in the number of vessels reporting within the fleet. The graphs show whether or not the Company was under way to achieving reduction targets[27] which had been set for a number of waste streams and emissions. The analysis also aims to illustrate how the different trades that the Company was involved in compared environmentally.

[25] Classification society; see explanatory note in chapter one.
[26] The International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code) aims to promote safety within shipping organizations by requiring companies to establish a systematic approach to the safe operation of ships. Under the ISM Code, an ISM manager is the organization which undertakes to assume the duties and responsibilities imposed by the Code.
[27] Uniform targets were set at Group level for the environmental management system (EMS) and these were based on inputs received from local ship management offices. A detailed description of relevant targets is offered in section 4.3.3.

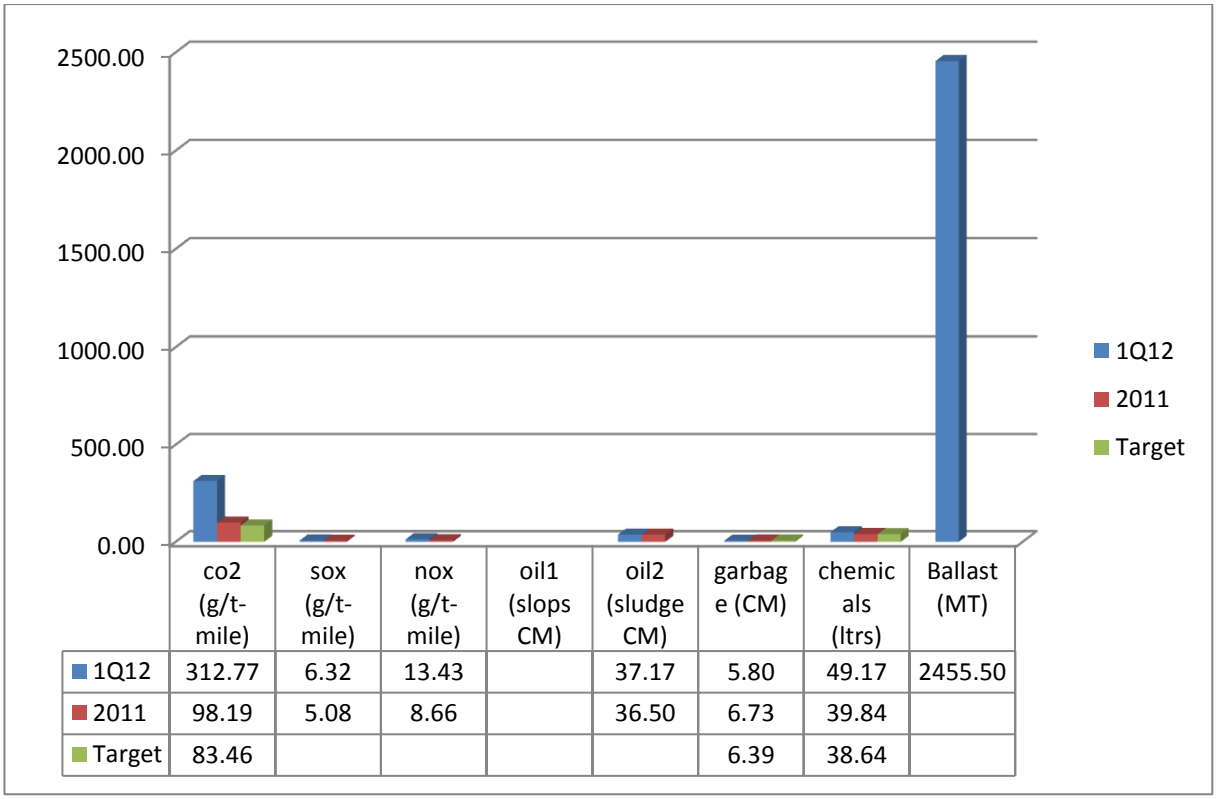
Figure 1 presents a fleet-wide analysis of the Company's environmental footprint. Atmospheric emissions data is measured in grams per tonne-mile (g/t-mile); oily wastes and garbage in cubic metres (CM); chemicals in litres (ltrs); and ballast water in metric tonnes (MT).



	co2 (g/t-mile)	sox (g/t-mile)	nox (g/t-mile)	oil1 (slops CM)	oil2 (sludge CM)	garbage (CM)	chemicals (ltrs)	Ballast (MT)
1Q12	187.67	9.13	8.63	109.88	9.22	6.78	70.72	3278.62
2011	208.58	4.26	4.98	130.99	10.56	6.72	89.26	3765.91
Target	177.30					6.38	86.58	

Figure 1: Fleet-wide Environmental Footprint

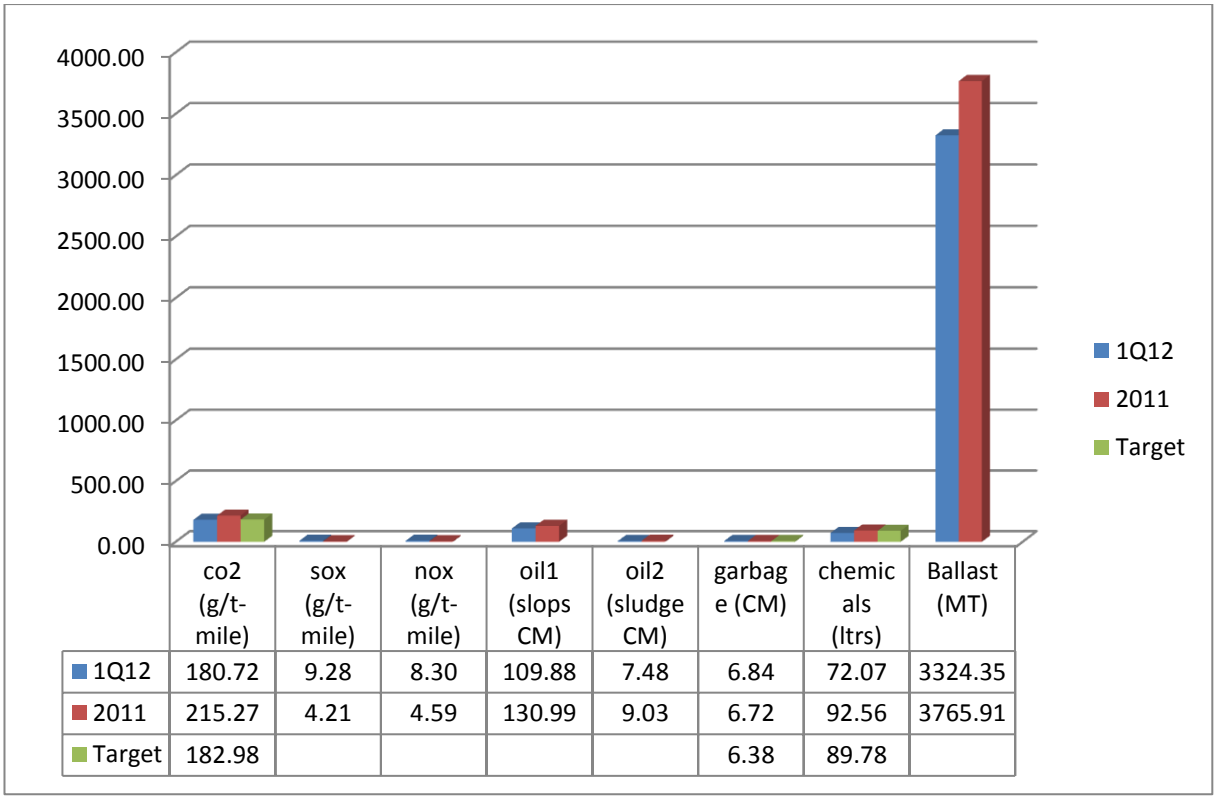
By the end of the first quarter in 2012, *Taf Shipmanagement* had achieved its target for reducing the use of chemical substances that may cause damage to the marine environment. However, the Company had not met its target for cutting garbage generation and for limiting carbon dioxide (co2) emissions. A different picture emerges when one considers environmental performance in the two markets in which the Company traded as shown in Figures 2 and 3.



	co2 (g/t-mile)	sox (g/t-mile)	nox (g/t-mile)	oil1 (slops CM)	oil2 (sludge CM)	garbage (CM)	chemicals (ltrs)	Ballast (MT)
1Q12	312.77	6.32	13.43		37.17	5.80	49.17	2455.50
2011	98.19	5.08	8.66		36.50	6.73	39.84	
Target	83.46					6.39	38.64	

Figure 2: Container Ships Environmental Footprint

Unlike with the rest of the fleet, ships operating in the container market had achieved the garbage reduction target during the first quarter of 2012. However, targets for reductions in the consumption of cleaning chemicals, and for cutting carbon emissions had not been met.



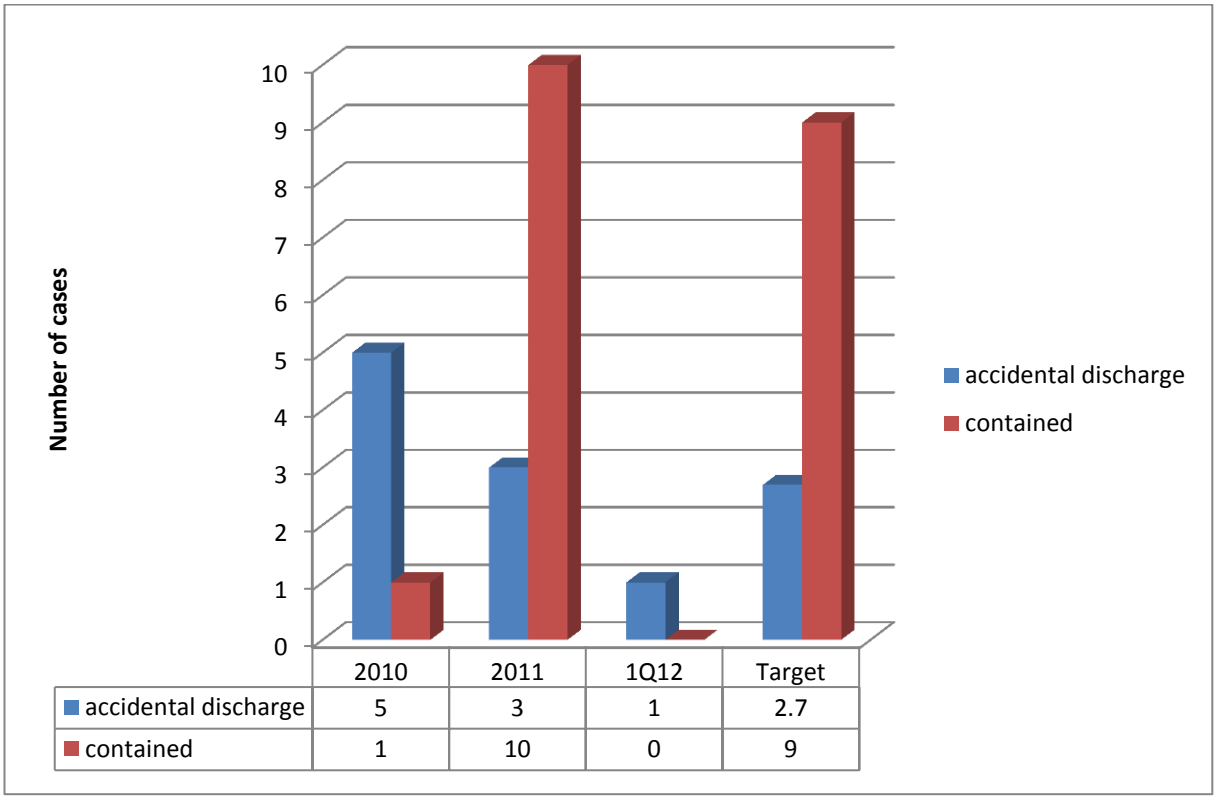
	co2 (g/t-mile)	sox (g/t-mile)	nox (g/t-mile)	oil1 (slops CM)	oil2 (sludge CM)	garbage (CM)	chemicals (ltrs)	Ballast (MT)
1Q12	180.72	9.28	8.30	109.88	7.48	6.84	72.07	3324.35
2011	215.27	4.21	4.59	130.99	9.03	6.72	92.56	3765.91
Target	182.98					6.38	89.78	

Figure 3: Tanker Ships Environmental Footprint

Overall, tanker ships seemed to have done comparatively better. By the end of the first quarter in 2012, the Company's tanker ships in the fleet had successfully reduced carbon dioxide emissions and the use of environmentally hazardous chemicals to the desired levels. Garbage reduction still appeared to be a challenge for ships in this sector. Furthermore, comparing the container and tanker sectors reveals that nitrogen oxide (nox) emissions and sludge generation levels were much higher on container ships. These are also significantly higher than the fleet average. This discrepancy is partly explained by significant under-reporting of nitrogen oxide emissions in Gas tankers. Similarly, the relatively smaller ballast water exchanges on container ships may be explained by under-reporting or perhaps failure by these ships to carry out the requirement. Overall figures for slops[28] appear too low for a tanker operator. Whereas their absence is justified for container ships which do not carry oil cargo in bulk, low slop numbers may be reasonably attributed to the mostly clean nature of the cargo (chemicals/gas).

[28] Hydrocarbon wastes containing highly variable amounts of water. This mixture of cleaning water and cargo residue results from a process of recovering cargo remaining on board after cargo tanks have been emptied.

Figures 4 and 5 illustrate the frequency of pollution incidents occurring on board the Company's ships. Incidents reported are for both marine and atmospheric discharges. The analysis aims to highlight whether or not the Company was on its way to achieving set reduction targets for pollution incidents (refer to section 4.3.3 later in this chapter). It further aims to show the extent of such occurrence within the fleet. Figure 4 shows the number of pollution incidents occurring between 2010 and the first quarter in 2012.



	2010	2011	1Q12	Target
accidental discharge	5	3	1	2.7
contained	1	10	0	9

Figure 4: Pollution Incidents by Number of Cases

The graph shows that the Company had met its target for reducing pollution incidents of any nature in the first quarter of 2012. It is also evident from the data that although accidental discharges had been declining over time, the number of pollution incidents contained on board had increased considerably with cases peaking in 2011. Figure 5 explores the occurrence of pollution incidents across the fleet.

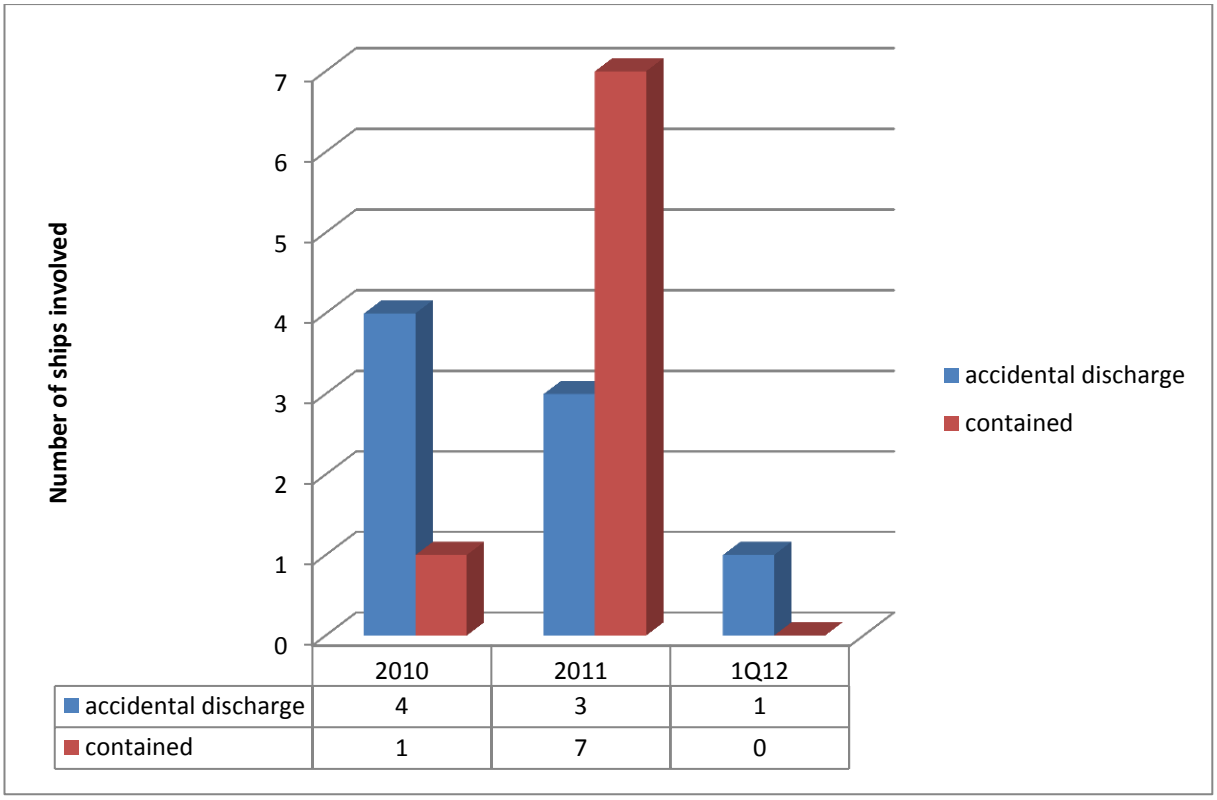


Figure 5: Pollution Incidents by Number of Ships

A steady decline can be observed in the number of ships involved in accidental discharges between 2010 and the first quarter in 2012. Again, a much higher number of ships were able to successfully contain incidents on board. It may be that such incidents were of a smaller magnitude and often operational in nature so that their occurrence would be unavoidable (e.g. small spills on deck during bunkering or painting). Taken together, the number of ships involved in pollution incidents increased 1.4 times more than the growth in fleet size in 2011[29]. Moreover, and bearing in mind a 5.6 per cent growth in fleet size during 2012, further increases in fleet size saw an overall reduction in pollution incidents by the first quarter of 2012.

Interestingly, the analysis of the data presented in Figures 1 to 5 above could have been extended to explore how the Company compared with the rest of the Group or indeed the shipping industry as a whole or even with set pollution reduction targets over time. However, because this environmental reporting system had only been introduced recently at the Company (with data going back to under two years), such comparisons

[29] The Company registered a 71.4 per cent increase in fleet size in 2011.

would bear little meaning as it becomes unrealistic to benchmark environmental performance across the fleet or against the Group. At the time of writing, comparable data from the shipping industry was not readily available, making benchmarking at this level difficult. In addition, no targets had been set by the Group with respect to waste reduction from a number of sources (e.g. nitrogen and sulphur oxides, sewage and oily wastes; see also section 4.5.3). For that reason, and in the absence of comparable industry data on environmental performance, this thesis will rely on publicly available data about the Company's regulatory compliance.

Table 2 summarizes historical data on port state control for the Company's ships in the last three years (2009-2012) against average levels for ships calling at ports in the United States and in Europe. Inspection records for *Taf Shipmanagement* reported here (see also Table 4) are based on EQUASIS[30] data. Paris MoU (PMOU) and United States Coast Guard (USCG) data are for the period 2009-2010. It is important to note that USCG data shown here does not include security-related (ISPS[31]) inspections as the Coast Guard computes these separately. Note also that USCG calculates detention ratios as a percentage of distinct arrivals (ignores multiple visits during a calendar year) rather than as a percentage of the number of inspections. For this reason, the percentage of inspections with deficiencies has been estimated (for USCG figures) following the same principle.

Table 2 : Port State Control Inspections 2009-2012

	Taf Shipmanagement	Paris MoU	USCG	Global average[32]
Inspections with deficiencies (%)	33.33	55.21- 57.25	29.90 - 31.00	55.47
Detained (%)	1.67	3.28 - 4.38	1.67 - 1.88	5.31

Source: Own calculations, from EQUASIS data; Annual reports PMOU and USCG

[30] See explanatory note earlier in this section.
[31] International Ship and Port Facility Security.
[32] Average for 2009. See IMO 2012.

About one-third of inspections carried out on the Company's ships during the past three years picked up deficiencies. These port state control deficiencies involved 20 ships. However, in comparison to the industry average for vessels trading in the United States and in Europe, *Taf Shipmanagement* fared considerably better. The Company also recorded only a small number of detainable deficiencies during the period.

Figure 6 compares port state control (PSC) deficiencies within the Company's fleet against the performance of the same vessels under previous ship management companies in the last three years.

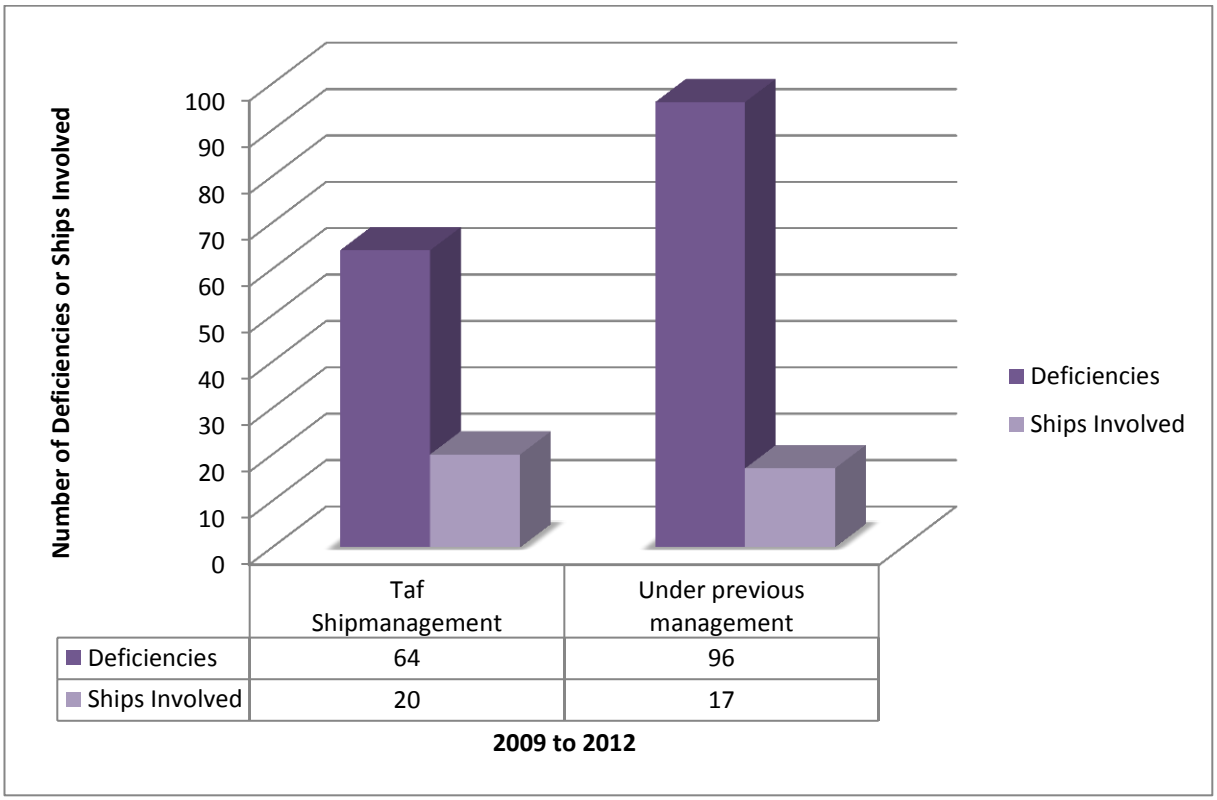


Figure 6 : PSC Deficiencies by Management Company

The Company's vessels had 1.5 times more deficiencies under previous management for almost the same number of ships involved. The ships appear to have fared better under *Taf Shipmanagement* during the period.

The following section describes the ships which this case study reports on.

4.3. The Case Study Vessels

The motor vessels *Fair Winds* and *Belle Mers* are the two container ships on which the shipboard phase of fieldwork for this research was conducted. At the time of conducting the study, these ships were on hire to two reputable liner shipping companies, both of whom are amongst the top league of global container shipping operators. Both ships were being operated under different arrangements. The *Fair Winds* was running a regularly scheduled service on 5-week round voyages calling at 12 ports between North West Europe and the Mediterranean. Unlike the *Fair Winds*, the *Belle Mers* was not trading on a scheduled service. At the time of carrying out the research, this ship was on hire for a fixed duration and during my stay on board, the rotation varied between several Caribbean and South American ports. Table 3 presents a profile of the two ships.

Table 3 : Summary of Container Ship Characteristics

	Fair Winds	Belle Mers
Age (years)	11	20
Time with Company (years)	>3	>1
Size (GT)	>26,000	>10,000
Capacity (TEUs)	2000-3000	1000-2000
Flag	UK	Singapore
Class	IACS member	IACS member
Operator	Bute Liner	Crwys Liner
Region	North West Europe and Mediterranean	US, South America and the Caribbean

Source: EQUASIS and Company database

The *Belle Mers* was a much smaller and older ship compared with the *Fair Winds*. At the time of conducting this study, the *Fair Winds* had been under the Company's management for over three years while the *Belle Mers* had only spent just over a year. The

Belle Mers had recently changed its flag from UK to Singapore. Ship operators are known to alter the countries with which their vessels are registered for fiscal reasons (Gardner and Marlow 1983), to reduce the regulatory burden under which their ships operate (see Sampson and Bloor 2007) or generally, to secure a competitive edge (Yannopoulos 1988; Bergantino and Marlow 1997). However, in this case the change of the vessel's registry was not to a flag of convenience but rather to another national flag. This development was raised during a follow-up meeting with managers and it emerged that the Company's decision to reflag was informed by the ship owner's strategic considerations.

Both ships had seaworthiness certification from a reputable classification society. Neither ship's flag was on the black list of regional port state control organizations such as the Paris and Tokyo MoUs. Although one of the ships' (the *Belle Mers*) inspections had led to a single detention under the current management company, neither ship's flag was on the targeted list of the United States Coast Guard. Table 4 shows historical data on port state control for both container ships in the last three years.

Table 4 : Port State Control Inspections by Container Ship 2009-2012

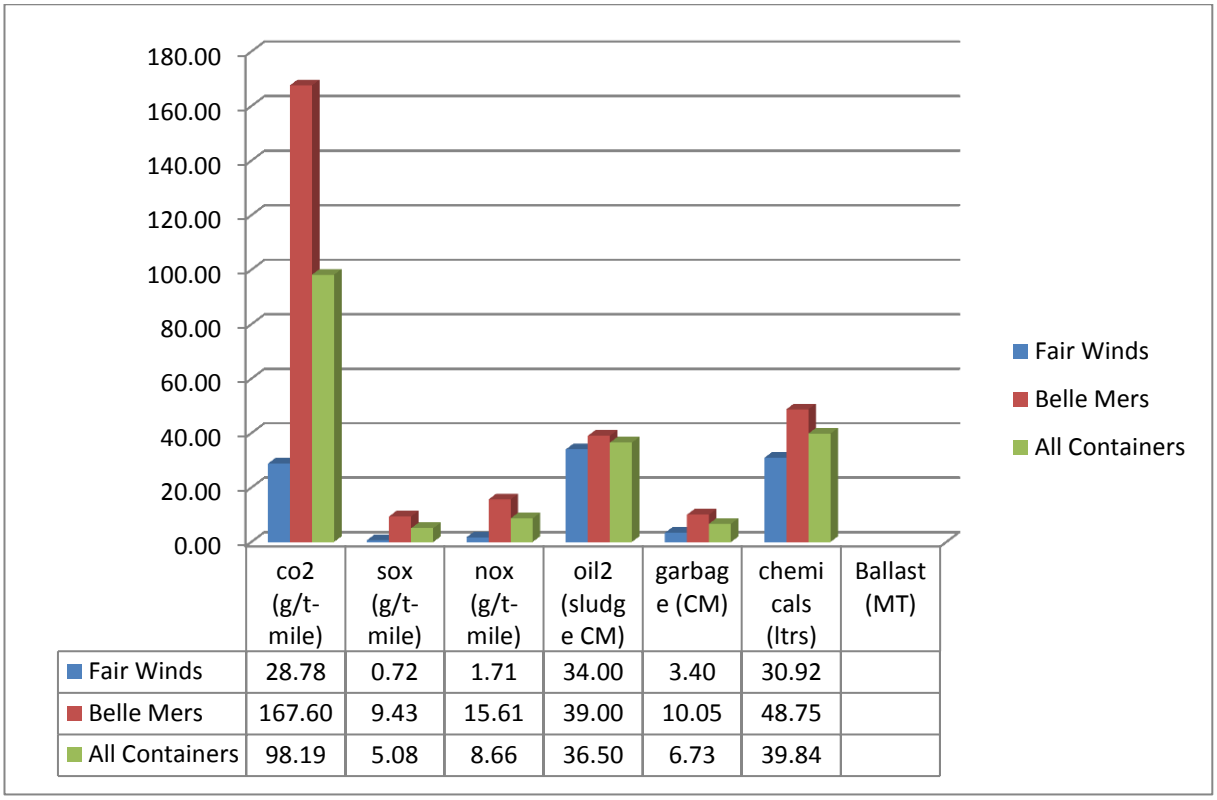
	Taf Shipmanagement	Fair Winds	Belle Mers
Number of Inspections	60	6	8
Number of Deficiencies	64	5	7
Number of Inspections with Deficiencies	20	2	3
Inspections with deficiencies (%)	33.33	33.33	37.50
No of Detentions	1	0	1

Source: Own calculations, based on EQUASIS data; Company SMS[33] and CMOU[34] database

[33] Safety Management System.
[34] See Caribbean Memorandum of Understanding (Carribean MoU 2010).

The *Fair Winds* had been inspected six times in the past three years under this Company, and only two of these inspections recorded deficiencies. The *Belle Mers* had undergone a slightly higher number of inspections with three of them picking up deficiencies. Whereas the inspections deficiency ratio for the *Fair Winds* is comparable to that for the entire fleet, the ratio is much higher in the case of the *Belle Mers*.

Figure 7 compares the environmental footprint of the case study ships against the average for all container ships in the Company's fleet. The data is based on vessel reports for 2011.



	co2 (g/t-mile)	sox (g/t-mile)	nox (g/t-mile)	oil2 (sludge CM)	garbage (CM)	chemicals (ltrs)	Ballast (MT)
Fair Winds	28.78	0.72	1.71	34.00	3.40	30.92	
Belle Mers	167.60	9.43	15.61	39.00	10.05	48.75	
All Containers	98.19	5.08	8.66	36.50	6.73	39.84	

Figure 7 : Environmental Footprint of the Case Study Ships

While the amount of sludge generated from both ships reflects the average for the Company's container ships, there are considerable discrepancies in atmospheric emissions, garbage generation and chemical consumption. The *Fair Winds* had generated a smaller amount of atmospheric pollution. This may be explained by the enforcement of much stricter requirements in Northern Europe where the ship mostly traded. Hence, the frequent use of cleaner fuels accounts for the lower carbon dioxide, sulphur and nitrogen oxide emissions from this ship. As indicated in section 4.2, the absence of ballast water

figures here suggests that all ships in the container sector had either failed to carry out the requirement during the year or did not report it. Such problems with getting ship staff fulfil environmental reporting requirements and to implement some of the environmental protection programmes on board the ship are explored and further discussed later in this thesis.

The crew [35] size and distribution among the traditional deck and engine departments was quite similar on both ships. Figure 8 illustrates this pattern. The *Fair Winds* carried a crew of 22 people whereas on the *Belle Mers* there were 21 seafarers. There were 8 people in the engine department on either ship. The difference in the deck crew size on either ship; and in the number of cadets between both ships was only one person.

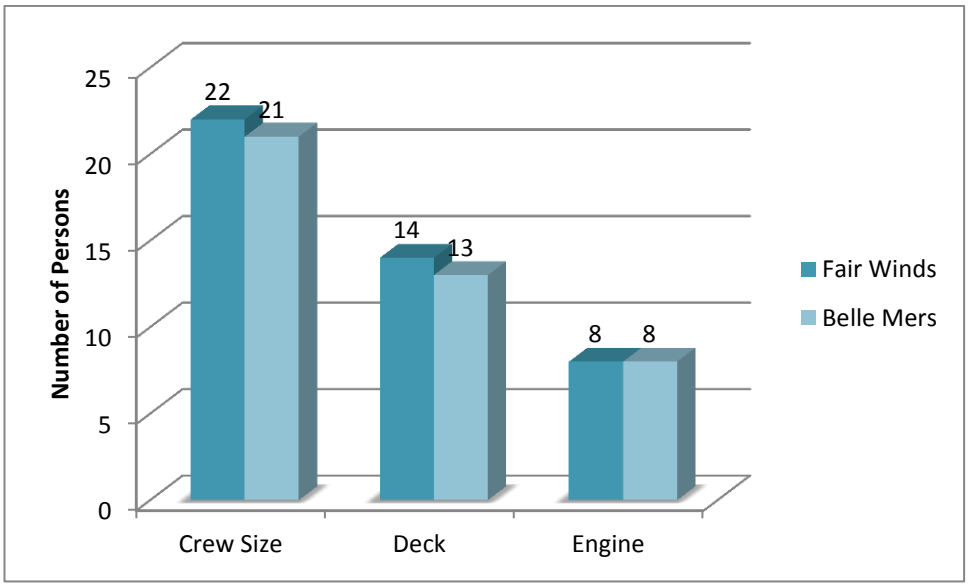


Figure 8 : Distribution of Crew by Department

The composition of crew by nationality on board was comparable for both ships. As highlighted in chapter three, the nationalities of seafarers on both ships could be broadly described as British, Eastern European and Filipino. However, the distribution of crew by nationality on board was slightly different for either ship mainly due to relatively higher

[35] Throughout this thesis the term "crew" is used to mean a ship's entire company including both officers and ratings. Similarly, "crew member" in this study means a seafarer of any rank.

numbers for some nationalities. Figure 9 shows differences in crew nationality patterns for both ships.

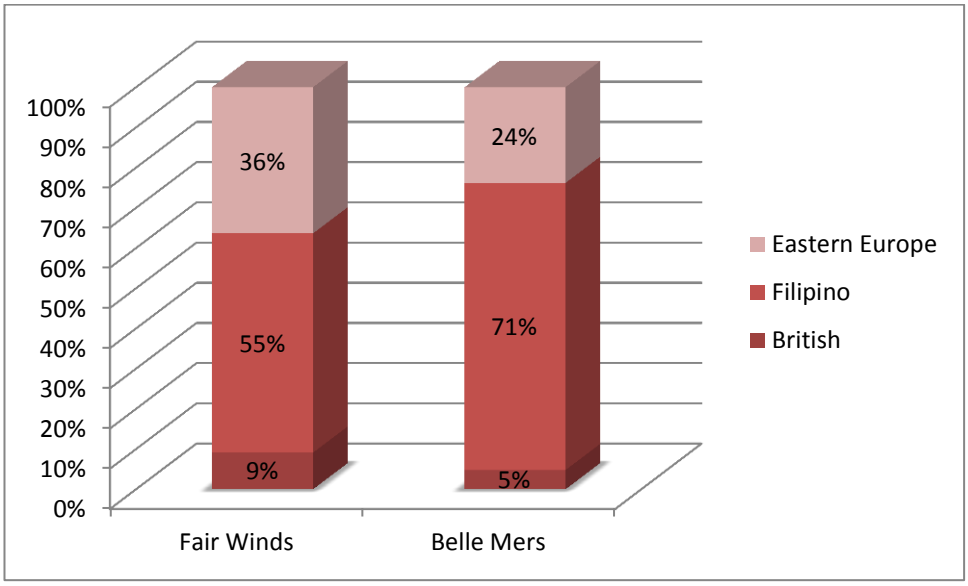


Figure 9 : Distribution of Crew by Nationality

The *Fair Winds* carried more British and Eastern Europeans, and fewer Filipino crew than the *Belle Mers*. For both ships, nationality ranking in order of magnitude was Filipino, Eastern European, and British. Filipinos were mainly employed as ratings and junior officers, whereas the Eastern European seafarers were all officers. British crew had joined as cadets.

4.4. Seafarers' Job Responsibilities on Board

Work on board the ship was divided into two main departments. These are deck and engine. Ship staff in the deck department were primarily responsible for the ship's navigation, cargo operations, general maintenance and day-to-day management of the ship's affairs. The deck department also had a sub-department for catering operations, known as the galley. Engine crew looked after the ship's main engines and associated equipment such as power plant, boilers and cargo pumps.

Seafarers who took part in the interviews reported duties across the conventional ranks[36] and positions in merchant shipping. On both ships, the hierarchy was basically the same and this is illustrated in Figure 10.

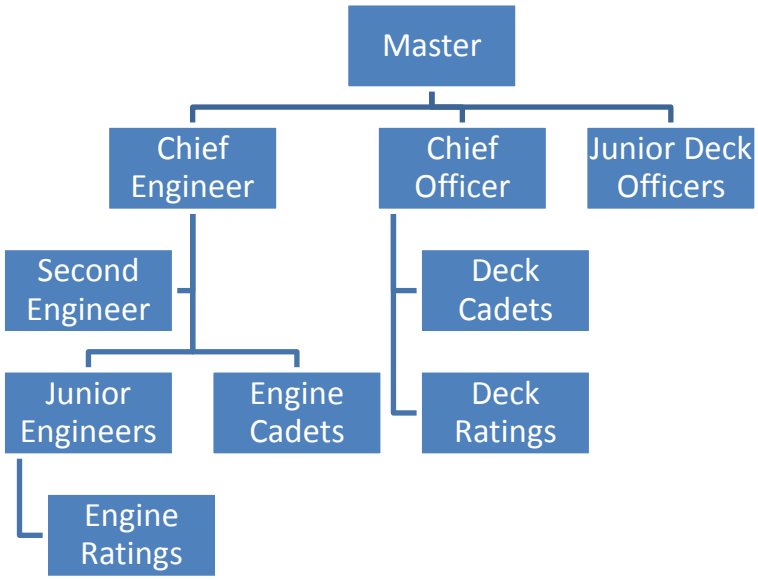


Figure 10 : Shipboard Organizational Chart

The Captain (also known as the Master) is the most senior member of staff on the ship and has complete authority and responsibility for the safe and efficient operation of his/her ship. The Captain is equally responsible for the safety of the ship's cargo and for the safety and welfare of his officers, crew and passengers. He[37] is the ship's main contact and as such liaises with shore management, various supply-chain stakeholders (including charterers), and with regulatory authorities. Being in command of the ship, the Master is also responsible for implementing company policies at the shipboard level and for conducting reviews of safety and pollution prevention programmes. On both the *Fair Winds* and the *Belle Mers*, the Master doubled as the ship's security officer. At *Taf Shipmanagement*, the Master, Chief Engineer, Chief Officer and Second Engineer are the senior officers on board the ship. They represent the Company's management team at the shipboard level.

[36] The Dutch system is slightly different with more positions and dual purpose crew.
[37] The predominance of male seafarers and captains is a feature of the sea-going workforce and hence the use of the pronoun "he".

The Chief Officer is the head of the deck department and the Master's deputy. The Chief Officer mainly managed cargo operations and was responsible for the ship's stability during cargo work and ballasting. He took part in navigational watchkeeping and assigned jobs to deck crew. He was also responsible for instructing Cadets, Junior Officers and Ratings in the deck department on relevant shipboard procedures. On both case study ships, the Chief Officer doubled as the ship safety and environmental officer. The Chief Engineer was responsible for all technical matters concerning the ship and for ensuring that engine crew were familiar with relevant procedures. He was tasked with conducting regular inspections of the ship's plant and equipment, and with testing stand-by equipment for readiness in case of emergency. He was also responsible for maintaining and updating the oil record book and engine log book accurately. Statutory and class surveys of the ship's plant and machinery were conducted with the assistance of the Chief Engineer. The Second Engineer assisted the Chief Engineer in ensuring the safe operation and maintenance of the ship's machinery. On both the *Fair Winds* and the *Belle Mers*, the Second Engineer was responsible for lubricating systems and auxiliary engines. He also assisted the Chief Officer in implementing environmental procedures in the engine room.

Junior Officers in the deck department were the Second Officer and Third Officer. Both officers took part in navigational watches. The Second Officer assisted the Chief Officer in ensuring the safe and efficient operation of the ship. As a ship's navigating officer, the Second Officer was responsible to the Master for voyage and passage planning during arrivals and departures, and for the maintenance of charts and navigational updates. On the case study ships, the Second Officer doubled as the ship's medical officer and was in charge of maintaining the ship's medical supplies and for providing relevant support during medical emergencies on board. He also acted as the Master's deputy for matters relating to the ship's security. The Third Officer was responsible for ensuring that all life-saving and safety equipment on the ship was in good working condition. Similarly, he looked after the ship's electronic aids to navigation. He assisted the Chief Officer with respect to safety matters. He also assisted the Master with the administrative aspects of running the ship including, the maintenance of records and inventory.

Junior Officers in the engine department were the Third (or Fourth) Engineer and the Electrician. One of the ships had a Third Engineer whereas the other had a Fourth Engineer in the absence of a Third Engineer. The Third Engineer is the higher grade and the job description for this position (technically) includes responsibility for fuel, water and

boilers. Fourth Engineers are required to operate and maintain the auxiliary engines. However, because the Company only employed either position[38] on a ship, crew who were hired in either position had to combine both roles. The Electrician was in charge of electrical equipment on the ship and monitoring of refrigerated cargo.

Deck Ratings were responsible for general maintenance and repair work on the ship. This includes chipping, painting and cleaning. They were also responsible for mooring and maintaining a look-out during arrival and departure. They assisted their officers as lookouts during navigational watch and with steering when required. In port, they assisted Junior Officers with gangway watches and monitored cargo operations by stevedores in port. Occasionally, they were assigned tasks relating to ship security. These included conducting searches for stowaways, explosives and concealed narcotics. Deck Ratings in the galley were Cooks and Stewards (known individually as "Messman"). They were responsible for the catering and housekeeping requirements of the ship. Engine Ratings assisted officers in the maintenance and operation of engine room equipment and plant.

Cadets were on board to learn and complete relevant aspects of their training portfolio. They were responsible to their line managers in the relevant department and they often carried out various tasks as assigned to them with respect to the department's responsibilities. On board both ships, I observed that Deck Cadets worked closely with the Ratings whereas Engine Cadets worked with the Third or Fourth engineer.

Besides adhering to the job descriptions described, crew were sometimes required to combine their efforts in order to perform a number of tasks on board. These mostly had to do with occasional work demands on board (e.g. bunkering) and in other cases, during emergencies (e.g. oil spill). For such events, every crew member on board was assigned specific duties.

Providing there was no scheduled arrival or departure, the working week on the ship was Monday to Friday and half-day on Saturdays. However, galley staff and those deck crew scheduled for navigational watch still had to be on duty throughout the week to ensure the continuous operation and safety of the ship. Deck crew normally worked shifts whereas engine crew enjoyed a typical working day. However, there was always a duty engineer on call outside the department's working hours.

[38] This phenomenon is common practice in the shipping industry and not peculiar to Taf Shipmanagement.

4.5. The Company Environmental Management System

4.5.1. The Company's Environmental Policy

The Company's environmental policy is: "to conduct its operations in an environmentally sustainable manner in order to protect the environment for future generations." Specifically, the Company aims to:

1. comply with relevant environmental legislation and regulation;
2. prevent pollution;
3. use natural resources efficiently;
4. minimize waste and emissions;
5. ensure environmental awareness of all employees;
6. monitor environmental performance; and
7. continuously improve environmental performance.

The Company's policy includes a "zero-pollution incident" statement and this is conspicuously displayed within its premises and aboard its ships. The policy is signed by the Group Chief Executive Officer and its objectives, as outlined above, reflect the need to minimize incidents, especially spills; to prevent known risks; to continually train both onshore and shipboard personnel; and to instil a sense of personal responsibility in all staff. The policy covers all areas of the Company's operations, including both shipboard and shore-side activities, and even extends to contracting, purchasing and supplying activities.

The policy is communicated to all employees and contractors and is made available to the public. There is scope for feedback from shore and sea staff to identify the need for changes in the policy, including changes in procedures and related equipment, with the objective of improving overall standards. There is also provision through the Company's "speak up" policy, for "everyone" (employees, suppliers, contractors and business partners) to "report any business misconduct" relating to the environment.

ISO 14001 and Other Environmental Requirements

There is scope for the Group's subsidiaries to tailor these environmental policy requirements to their specific business needs. For example, *Taf Shipmanagement's* environmental management system (EMS) is certified under the International Organization for Standardization's ISO 14001:2004 standard by a leading global quality assurance firm. According to managers in this study, the decision to pursue certification under the ISO 14001[39] standard was in anticipation that customers would be interested in the Company possessing an ISO-certified EMS. Managers also reported that getting registered under ISO 14001 was equally a means of securing a competitive edge in the market.

Again, because *Taf Shipmanagement's* customers are mainly oil and chemical companies, the Company is bound to comply with a number of additional environmental requirements. These include best-practice guidance from trade associations such as the Oil Companies International Marine Forum (OCIMF) and the Chemical Distribution Institute (CDI). The Company also has to comply with individual customer requirements on environmental management, particularly those of oil majors. The impact of such supply chain influences and the implementation of a quality management system for environmental compliance are some of the pressures which this study will identify in relation to how ship staff perceive environmental compliance to affect them.

4.5.2. Roles and Responsibilities in the EMS

At *Taf Shipmanagement*, all employees have a role to play towards preserving the environment. However, responsibility for implementation is primarily with line management. Figure 11 illustrates the allocation of environmental responsibility to line management in the organization.

[39] ISO 14001 is an internationally accepted standard that signifies an organization's commitment to reducing its environmental impact.

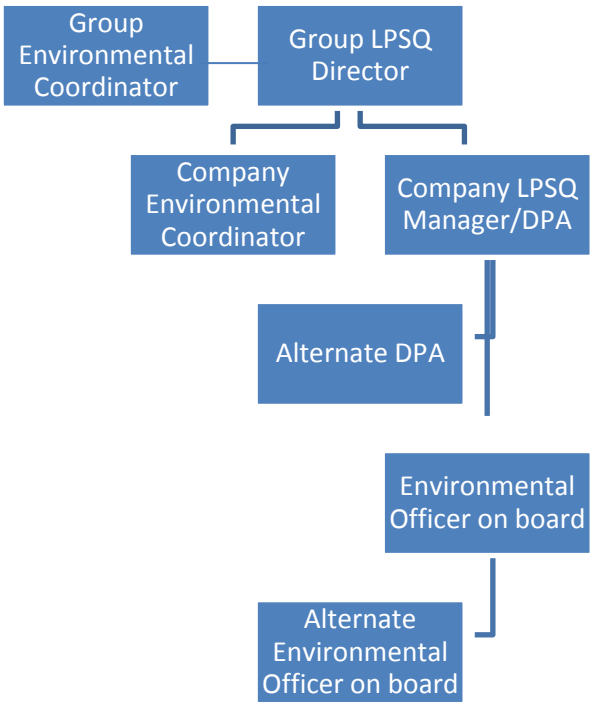


Figure 11 : Flow of Environmental Responsibility within the Company

Internal communication of the Company's environmental requirements originates from the Group Environmental Coordinator, in consultation with the Group loss prevention, safety and quality (LPSQ) Director and local LPSQ Manager, and then downwards. The Company top management appoints a representative at the local level, known as the Environmental Coordinator, normally a technical or fleet manager. The Company LPSQ Manager also doubles as the Designated Person Ashore (DPA), and a technical manager or superintendent is the Alternate DPA ashore. In accordance with the provisions of the International Safety Management (ISM) Code[40], the DPA is the person with direct access to the highest level of corporate management and with whom crew members can raise any environmental protection-related issues. The Designated Person is responsible for monitoring pollution prevention and for ensuring that the Company's ships are adequately resourced for environmental compliance. Through the LPSQ department, the DPA investigates reported non-conformances with Masters and Superintendents, and analyses data on environmental performance to improve the environmental management system (EMS). Marine superintendents are assigned to specific ships within the Company's fleet to

[40] See explanatory note earlier in this chapter.

conduct ship environmental audits and to provide shipboard support and training for protecting the environment.

At the shipboard level, the Chief Officer is the Designated Environmental Officer on board, whereas the Master is the Alternative Environmental Officer on board. The Chief Officer investigates audit-identified non-conformities and applies corrective action as agreed with the LPSQ department. The Master is responsible for conducting the EMS review which reports any non-conformances or environmental concerns from the ship every half-year. This report also provides feedback from monthly environmental (and safety) meetings held on the ship. The Master is equally responsible for disseminating Company reports on lessons learnt from EMS-related incidents amongst officers and crew. The Master and Chief Engineer are responsible for preparing monthly environmental reports (EMS-01) for the ship. Environmental training and awareness for ship crew is achieved through drills and computer-based training. The Master is responsible for the evaluation and review of this training on board, while the Chief Officer is responsible for programming and recording them.

Although Junior Officers do not feature on the flow diagram in Figure 11, they are typically tasked with assisting their superiors in the fulfilment of EMS responsibilities. All other crew members are required to comply with pollution prevention regulations and related operating procedures. Job specific requirements are covered in the EMS manual and a number of these have been described in the findings in chapter five.

4.5.3. Company Environmental Impacts

One of the aims of an environmental management system is to systematically identify and measure all sources of marine and atmospheric pollution attributable to an organization's activities and operations (Barwise 1996). These are known as "environmental impacts". The listing and assessment of impacts is important because it helps to identify and set targets for maintaining a high standard of environmental performance. *Taf Shipmanagement's* list of environmental impacts covers both shore-based and shipboard activities. However, the discussion of the Company's environmental impacts in this section will be limited to those operations and activities that take place on board the ship.

Compiling a register of environmental impacts is a self-assessment exercise. Thus, only impacts that are deemed "significant" by the implementing company are normally retained in the final register. At *Taf Shipmanagement*, five criteria were used to determine the significance of an operation. These were:

1. environmental or health impact of the activity;
2. legislation regulating the activity;
3. probability of occurrence of the activity;
4. frequency of occurrence of the activity;
5. severity of the impact; and
6. third-party (customer or media) interest in the activity.

Those shipboard activities scoring a total of 14 points or more from any of the above criteria or a combination thereof were deemed by the Company to cause a significant environmental impact. Such activities were classified into the following broad categories within the Company's environmental management programmes:

1. Marine Pollution;
2. Ballast Water Exchange;
3. Waste Management (Solid wastes and Sewage); and
4. Atmospheric Emissions.

Objectives, targets and procedures for monitoring and controlling activities falling under the above categories were clearly defined within the Company EMS. For all such activities, the Company aimed to reduce the number of pollution incidents whilst striving towards achieving the overall goal of zero pollution. Accordingly, the Company had set a 10 per cent reduction target for pollution incidents of any nature over previous year. This target covered both accidental discharges and those that were successfully contained on board. The Company also sought to cut back on the volumes of some waste types and to reduce the use of substances that may cause damage to the marine environment. For example, there was a 5 per cent reduction target for garbage generated over previous year and the loss of ozone-depleting substances was to be kept below 15 per cent over previous year levels. A 3 per cent reduction in the consumption of cleaning chemicals over previous year

had also been set. However, at the time of conducting the study, no reduction targets had been set for sulphur and nitrogen oxide emissions, ballast water exchanges, and the generation of oily wastes (sludge and slops).

The fact that pollution reduction targets were in place at the Company suggests that ship staff may have been under pressure to achieve these; or perhaps that seafarers resorted to incorrect procedures (e.g. dumping waste at sea) or simply misreported the figures. However, because the targets had only been set recently, this is not captured in the data. Nevertheless, the findings will point to difficulties with complying with the different environmental programmes as reported by seafarers and managers.

4.5.4. Health and Safety in Environmental Management

There had been various forms of occupational injury to crew at the Company and cases occurring in the last two years are identified in this section. Figure 12 shows the frequency of occupational health and safety (OHS) incidents occurring aboard the Company's entire fleet during 2010 and 2011.

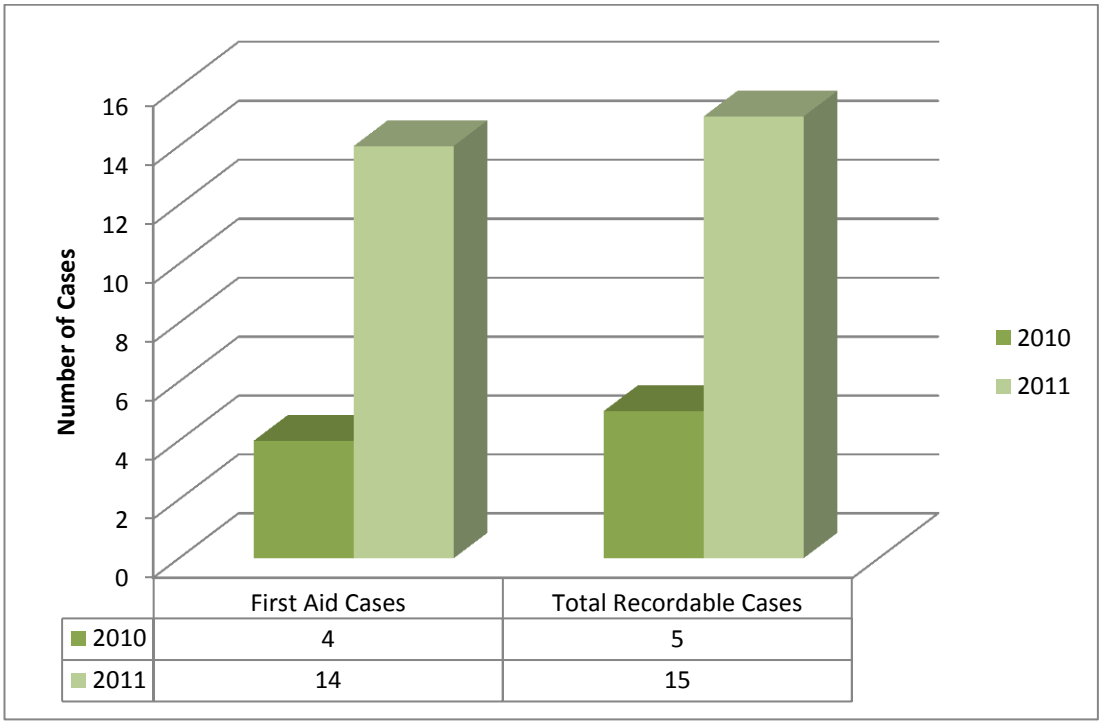
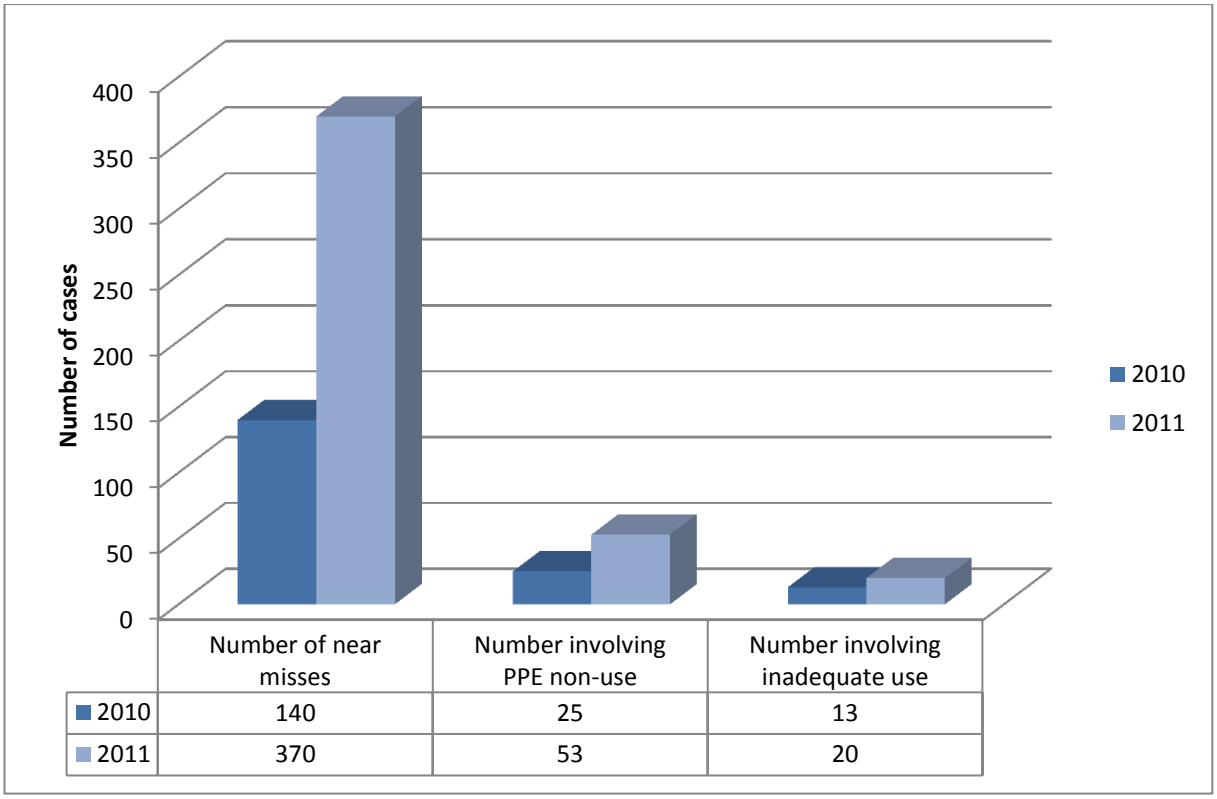


Figure 12: OHS Incidents by Number of Cases

The graph shows that the number of first aid cases[41] (FAC) and total recordable cases[42] (TRC) during the period was on the increase. While the number of first aid cases at the Company clearly highlights a growing number of incidents, it was difficult to say explicitly, whether any or how much of these injuries were being caused by activities or events relating to environmental protection on board the ship.

A closer examination of the incident data at the Company revealed a growing trend in the number of near misses[43] involving inadequate[44] use or non-use of personal protective equipment (PPE). It was company policy that all near misses, incidents and injuries occurring on board be reported. Accident and near miss discussion was encouraged during safety and environmental protection committee meetings on board the ship in order to emphasize the importance of reporting and to discourage the view among crew that reporting was a means to personal criticism or blame (see also Bhattacharya 2012[a]). At the time of conducting this research, the Company was exploring the possibility of introducing a reward based scheme (for the best performing ship) to further encourage shipboard reporting. Considering that there was no incentive in place yet, the level of near misses for the Company in the last two years may be described as significantly high. Figure 13 illustrates this.

[41] Industry guidelines for marine injury reporting (see also OCIMF 1997) define first aid cases as any one-time treatment and subsequent observation or a minor injury.
[42] Total recordable cases include the sum of all work-related fatalities, lost time injuries, restricted work injuries and medical treatment injuries.
[43] These are hazardous occurrences or events which did not result in an injury but which, under different circumstances, could have done so.
[44] Defective, inappropriate or unapproved protective gear.



	Number of near misses	Number involving PPE non-use	Number involving inadequate use
2010	140	25	13
2011	370	53	20

Figure 13: Hazardous Occurrences by PPE Usage

Between 2010 and 2011 the number of near misses reported aboard the Company's ships more than doubled. However, the contribution from non-use and from inadequate use of personal protection diminished during the period, by 3.6 per cent and 3.9 per cent of total near misses, respectively.

The Company, nevertheless, recognized that there was a risk of harm to crew from the fulfilment of environmental protection-related tasks on board the ship and a number of procedures, checklists and permits had been provided within the safety management system (SMS) as control measures to minimize or eliminate these hazards. Key among this guidance was the PPE matrix (see Appendix 7) and company risk assessments. Of the Company's 185 risk assessments for various shipboard tasks, about 12 of these can be classified as activities partly or wholly connected with protecting the environment on container ships. Table 5 summarizes these activities by number of hazards identified by the Company. The aim is to highlight which aspects of environmental management may pose the most threat to shipboard workers' health and safety.

Table 5: Company Risk Assessments

Environmental Concern	Activity/Task	Number of Hazards identified
Ballast Water	Ballast handling in port	1
Oil and Oily Wastes	Operation of Oily Water Separator	3
	Bunkering	7
	Cleaning engine room bilges	6
Garbage	Garbage handling and disposal	3
	Incineration	2
Emissions	Fuel changeover	0
	Work on boilers	13
	Work on purifiers	9
Sewage	Work on Sewage system	3
Maintenance Wastes and Chemicals	Handling paint residues, rust and dust	17
	Chemical handling and clean-up	14

Source: Author, based on Company SMS Manual

The above distribution of the Company's risk assessments suggests that managing maintenance wastes and the handling of chemical wastes on board could be the most hazardous environmental protection-related activities on board container ships. These are followed by work on boilers and purifiers, bunkering operations and cleaning of engine room bilges. In the Company's risk assessment for specific tasks, fatality consequences were identified for handling ballast in port and with using the oily water separator. These were due to electrocution and incorrect operation or malfunction of the equipment. The likelihood of a fatality occurring was also identified with work on boilers and sewage

systems from the presence toxic gases or the lack of oxygen. No personal injury risk or danger of death was identified with fuel changeover operations. However, there are potential risks associated with switching between high and low sulphur fuels. Boilers and engines may be affected including potential explosions where the changeover is not performed correctly (International Chamber of Shipping 2010; AGCS 2012).

4.6. Summary

This chapter has outlined the main features of the company on which this case study reports. In particular, the discussion has provided an overview of the business activities of *Taf Shipmanagement* and its corporate structure. The discussion has also highlighted the profile of the two ships on which fieldwork for this research was conducted.

As shown in the chapter, *Taf Shipmangement* can be described as a reputable global shipping entity. While the Company's core business is in the Tanker market, its presence in the Container sector is not negligible. The framework for environmental compliance within the Company is well developed as demonstrated by the operation of an environmental management system. There are detailed procedures in place and clearly assigned responsibilities to assist in the implementation of requirements for environmental protection.

The data on environmental impacts assessment, and reports on the Company's environmental footprint, suggest a keen interest by managers in monitoring environmental compliance and addressing any shortcomings. As the findings will demonstrate, this approach by managers to monitoring compliance on board the ship produced negative feelings amongst ship staff.

The analysis in this chapter has also shown that the Company was nearly meeting its environmental targets and pollution incidents at the Company were on the decline. Moreover, the analysis of port state control inspection records suggests that the standards of safety at *Taf Shipmanagement* are generally better than the industry average.

A clear outline of the responsibilities of ship staff and managers in implementing the Company's environmental programmes demonstrates the extent to which employee participation at all levels within the organization was crucial for achieving *Taf Shipmanagement's* environmental objectives. Nevertheless, as the findings in the following

three chapters will demonstrate, ship staff did not always feel supported by the Company whenever they made suggestions for improvements or raised issues in relation to environmental compliance on board the ship.

CHAPTER FIVE: MANAGING CONTAINER SHIP SOURCE POLLUTION AND SHIPBOARD PRACTICE: GARBAGE, SEWAGE AND BALLAST WATER

5.0. Introduction

This chapter is the first in a series of three findings chapters (chapters five, six and seven) which explore company practices for managing marine and atmospheric sources of pollution on container ships and seafarers' experiences in operationalizing these. In exploring the perceptions of both shore-based managers and ship staff about what constitutes environmental compliance, the aim is to ascertain what programmes are in place and whether seafarers and managers think that there are any adverse health and work-related impacts from the everyday practice of complying with pollution prevention at sea. The analysis in this findings chapter and in the next two chapters also considers the differences and similarities between the perceptions of managers and ship staff at the Company. In part, the data analysis serves to illustrate how seafarers continually assess and assign relative values to the importance of environmental management. The two overarching issues transcending the findings which these chapters will emphasize are: the potential for occupational exposure due to unsafe working practices among seafarers; and the experience of psychosocial stress from the fulfilment of environmental requirements.

To achieve these aims, the analysis will reference two major international agreements regulating ship-source pollution as a basis for discussion in each section of the findings. The first of these agreements is the International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978, also known as MARPOL (see IMO 2006). In the analysis, I will draw on four out of the six annexes of MARPOL which cover various sources of pollution from ships, in order to examine what practices are available for managing garbage; oil and oily wastes; sewage; and container ship emissions. Reference will also be made in the discussion to another important international instrument – the International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004, also known as the Ballast Water Convention (see IMO 2009[a]). This Convention regulates the discharge of ballast water from ships and will form the basis for addressing a fourth waste stream – transfer of harmful organisms and pathogens in ships' ballast water. For each of these five marine and atmospheric sources of

pollution, the findings chapters describe (1) what the procedure is for managing the waste stream; (2) how the waste stream is actually managed on board; (3) who is responsible for the tasks; and (4) how persons performing the task feel about it.

The analysis in this first findings chapter is structured around three topics: garbage; sewage; and ballast water. In exploring the perceptions of seafarers and managers about what environmental compliance entails in these three areas, the analysis under garbage management will demonstrate significant variances between seafarers' understanding of the ship garbage management plan when they were operationalizing this. I argue in this section that although seafarers generally appreciated the significance of safe working practices on board, they appeared to be complacent when it came to fulfilling garbage management-related tasks and therefore behaved unsafely.

The analysis under procedures for managing sewage and ballast water (sections two and three, respectively) further demonstrate that both managers and seafarers in the case study had a common understanding of the requirements and procedures for implementing company programmes in these particular areas. This is likely to be related to the largely automated nature of the processes for managing these waste streams.

Accordingly, sections one to three of this chapter describe the requirements and procedures for managing polluting substances on board the Company's ships. Specifically, each section draws on company interviews and documents to analyse managers' perspectives on how the Company implements legal requirements for managing different container ship waste streams and emissions and the challenges with doing so. I then move on to outline the perspectives of seafarers in relation to the way they operationalize Company procedures and legal requirements on board, and particularly how they feel about carrying out various environmental protection-related tasks. In considering the seafarer perspective, the discussion will draw on shipboard interviews and ethnographic observations.

5.1. Garbage

Ships spend most of their time at sea. Since the crew are continuously living on the ship and in close proximity, good housekeeping is crucial for ensuring health and safety on board (MCA 2010). In regard to this, the disposal of garbage from the ship's living spaces requires particular attention. Garbage, as defined in Regulation 1 (1) of MARPOL Annex V, includes all kinds of victuals, domestic and operational wastes (excluding fresh fish), generated during the normal operation of the ship. This definition excludes substances which are regulated under other Annexes of MARPOL such as sludge and other solid wastes (e.g. some types of cargo residues). Garbage generated on board container ships typically include packaging materials from the ship's victuals and stores, and those used for their transit and storage. It also covers waste generated by the activities of crew, visitors and contractors (e.g. stevedores), and food waste. Garbage can include hazardous waste such as pyrotechnics, batteries, lamps, medical waste, oily/contaminated rags and filters, and paint and chemical drums.

There are no recent studies on the amount of garbage generated by cargo ships. However, according to an estimate for ships calling at US ports, each vessel generated an average of 14 tonnes per year or 2 kilograms per day for each crew member (National Research Council 1995). On the case study ships, the average monthly garbage generated in 2011 was 3.4 cubic metres[45] for the *Fair Winds* and just over 10 cubic metres for the *Belle Mers* (or 0.006 and 0.17 cubic metres per day, respectively, for each crew member).

Annex V of MARPOL details what type of garbage can and cannot be dumped at sea and imposes specific requirements in certain sea areas where such disposal might have ecological or navigational implications. Special areas within the trading region covered by the case study ships were the North Sea and Mediterranean Sea areas for the *Fair Winds*; and the Wider Caribbean region for the *Belle Mers*. In all three areas, the disposal of garbage of any kind is strictly prohibited. However, food waste may be disposed within the guidelines, except in the Caribbean region where the waste must be processed prior to disposal.

[45] A conversion of the units for measuring garbage would enable comparison of garbage generation estimates in both studies. However, such a conversion requires knowledge of the density of the materials involved.

5.1.1. Collection, Processing and Storage of Garbage: Managers' Perspective

Regulation 9 (2) of MARPOL Annex V requires ships of 400 gross tonnage or more and those certified to carry at least 15 persons to have written procedures for collecting, storing, processing and disposing of garbage. For each of the Company's ships, these instructions were contained in a garbage management plan set out in the Environmental Management System (EMS). The Chief Officer was in charge of implementing the plan. Garbage was to be collected and stored in receptacles according to the different MARPOL categories. These receptacles were colour coded and marked for their content. Table 6 summarizes the Company's colour coding system for collection and storage of different garbage types.

Table 6 : Garbage Categories by Colour Code

Garbage Category	Description	Colour Code
1	Plastic	Red
2	Floating dunnage, lining, or packing materials	Yellow
3	Ground paper products, rags, glass, metal, bottles, crockery, etc.	Green
4	Cargo residues, paper products, rags, glass, metal, bottles, crockery, etc.	Black
5	Food waste	Blue
6	Incinerator ash (non-plastic)	White

Source: Company EMS manual

Garbage collection points were designated for temporary storage of waste in areas where they were likely to be generated on the ship. These include living spaces and facilities on the ship such as the galley, pantry, cabins, laundry and hospital; and at workstations such as the bridge, ship's office, engine control room, engine room workshop, next to the incinerator plant and paint store. Receptacles in each area were assigned to a specific crew

member to ensure regular and correct disposal of specific garbage types. For example, according to the Company EMS, the responsible person for collection of metal and rust particles is the Bosun, and the collection point is the Bosun's store. The Second Engineer is responsible for the handling and storage of garbage within the ship's machinery spaces, whilst the Chief Officer is the responsible person for the deck and galley departments and for garbage disposal ashore.

The collection, segregation, and storage of garbage on board into the categories described in Table 6 was necessary to facilitate landing of garbage in port reception facilities. Proper segregation of garbage into the correct categories was also significant for avoiding penalties in port. The following quote is an example of an arguably trivial case of poor segregation of garbage on board which, nevertheless, led to the Company incurring a fine during a regulatory inspection:

> *Again back in America, all the garbage bins were segregated but somebody had thrown a banana skin into the plastics bin. The US Coastguard came on board, did an environmental check. They looked in this bin in the galley and the vessel was fined US$5,000 for one skin – one banana skin. (Max [onshore personnel 7])*

Although disposal at sea of incinerator ash from non-plastics is allowed under MARPOL within the guidelines, such disposal was restricted by the Company. According to the Company's policy, ash generated from the incineration of non-plastic garbage must only be landed ashore. In addition, incineration of plastics was prohibited by the Company even if the ship's incinerator were approved to burn plastics. Normally, plastics can be incinerated within MARPOL guidelines and ash from plastics must be retained on board for shore disposal because it may contain toxic or heavy metal residues. However, it is not clear whether the Company's policy not to burn plastics was driven by the need to limit crew exposure to malignant by-products from shipboard incinerators or by other factors (see also National Research Council 1996). Nevertheless, this thesis speculates that the Company might have adopted this approach to ensure that it complied consistently.

One of the major concerns coming from the Company with regards to garbage management procedures on board the ships had to do with getting crew to recognize the importance of using the correct receptacle when bringing waste to garbage collection points. According to the Company, most crew came from countries where green practices

were not a natural part of their culture. As such, the challenge for the Company had been to instil more environmentally-friendly practices and behaviours in the minds of the crew:

> *And when they come from places like this to suddenly be confronted with [pause] "You can't throw that in the sea, no no no (sic); you've got to… you can't put that in that bin; that's got to go in that bin," you know. So it's all about re-training and convincing our crew members of the necessity to comply with environmental regulations. Because it doesn't come natural to them you know, um whereas you know most, let's say people from you know, western countries um where it's been drummed in to them right from school children now that you know, it's all about protecting the environment [pause], recycling; whereas if you grew up on the streets of Jakarta, or Manila, or wherever… (Bill [onshore personnel 2])*

Clearly, for managers this was an education problem. However, it might be that the problems were also being caused by resource constraints aboard the ship. This is worthy of further discussion in light of the consequences for shipboard personnel. As will be demonstrated in the discussion in chapter eight (see section 8.2), failure by crew to adhere to the guidelines for collection, segregation and disposal of garbage on board was stirring a feeling of angry frustration among staff responsible for sorting the ship's garbage.

The next section will look at how seafarers operationalize the requirements of the garbage management plan on board, and how they feel about performing tasks related to the collection, segregation and storage of garbage on the ship. The analysis further examines seafarers' usage of personal protection in the practices for managing garbage on board the ship.

5.1.2. Collection, Processing and Storage of Garbage: Seafarers' Perspective

On both ships, the procedures for managing garbage were generally being adhered to. Waste was collected in the appropriate categories at designated points, and then transported either to the central garbage area on deck or to the incinerator room. On one of the ships, a notice was posted designating responsibility for segregating garbage on board as follows: Chief Officer for overall responsibility; Fitter for engine waste; Chief Cook for domestic waste; and an Able Seaman (AB) for deck waste. Responsibility for managing garbage on board is further illustrated in this deck officer's description of the ship's garbage management plan:

[…] In this garbage management plan there is stipulated who is responsible to discharge the garbage for both sides - it means for deck side or for engine side. For example garbage disposal is mainly responsible by chief officer from deck side and 2nd engineer from engine side. And bosun is overall in charge to supervise all garbage disposal as well as chief cook and messman. So it means chief officer, 2nd engineer, bosun, chief cook, messman - these five personnel are involved in this garbage management operation. Normally, for our private garbage, we have to throw in the garbage bin after sorting in accommodation. […] (Mark [deck officer 2])

Individuals were responsible for collecting, segregating and bringing their cabin and personal wastes to the central garbage area on deck. Only officers were exempted from this practice and the Messman was designated to perform this task for them.

Yes we have all the garbage bins also in every cabin. And even myself I separate all these plastics and then for the officers, the messman collects our garbage; and for the crew, they are the ones disposing it. […] (Akwasi [deck officer 6])

Nevertheless, a number of practices on board were not consistent with procedures in the garbage management plan and therefore presented health hazards for crew. One such example was the management of food waste. The *Belle Mers* was trading in a special area where the disposal of all types of garbage was prohibited at sea, including food waste (unless processed within the guidelines). However, because this ship did not have the necessary equipment on board, as confirmed by one rating in the following quotation, food waste was retained on board for longer periods:

Kofi [deck rating 11]: If I will throw overboard, I will ask permission if it can be or cannot be thrown - the food waste at sea. […] So I call to the officers and they will tell me ok it's possible to or not. […] If we have on board this machine [comminutor[46]]; but not all ships have.

Researcher: Does this ship have it?

Kofi: No. […] I will just put in the bin on the second deck and wait for port and then maybe some [ports] they collect garbage at the port, they will take from the ship.

According to another deck rating, long term storage of food waste was also caused by long stays in port, resulting in an offensive smell from decomposition:

[46] Equipment for grinding up coarse material into fine particles that is easier to handle downstream.

[…]When it stays two-three days it starts smelling. […]But this only happens when vessel stays long in port. In this kind of route, it's one day and a half and we arrive already in the next port. (Yaw [deck rating 10])

This does seem to imply that the ship was not adequately resourced to cope with the amount of food waste generated on board. The ship garbage management plan required that receptacles for long term storage of garbage to be of adequate capacity for the ship's voyage and to be secure enough to keep waste in safe and hygienic conditions. Even though food waste was being disposed ashore on arrival in port, more of such waste would be generated during the vessel's stay in port. These would then be held on board and accumulated with waste from the next voyage.

Another example of rules being broken at sea is provided by the procedures for incinerating garbage on the ship. On one vessel, I learnt that waste which was brought to the incinerator room included paper and rags. During a visit to the engine room, I found a notice handwritten in bold on a piece of cardboard next to the rubbish bags by the incinerator plant, warning against cans and bottles. Most of the garbage was already segregated before being passed on to the person operating the equipment. The rubbish was fed into the incinerator in small sections so that the operator could double-check that prohibited items had not been included. A cadet was responsible for operating the incinerator under the supervision of the Second Engineer. As I observed the cadet burning the rubbish, he told me mostly paper was burnt and only one plastic bag (which held the rubbish) was allowed to go through. However, another cadet had expressed unwillingness to be involved with operating the incinerator. According to him, plastics were being pushed through the garbage to be burnt and he was concerned about having to take the blame in the event of a port state control inspection:

Serge [Cadet 2]: […] Yes they protect the environment here but only one thing I don't like: about incinerating only. Because burn plastics. I don't want to be involved again with that. That's why I am passing that to the [new] cadet. [...]

Researcher: Tell me - what is your reason exactly for not wanting to use the incinerator; is it just only because of the plastics?

Serge: Yes plastics, because I don't like to burn plastics. But because [person's rank] said that it could cause bad to my career if there is some inspectors coming. They could put the blame on me because what if they say: "Hey I didn't say that burn plastics." [Person's rank] will tell: "I didn't tell him to burn plastics; I tell him that to segregate." And then they could put the blame on me. That's why I don't like that.

Although this cadet's reason for not wanting to carry out the task of burning wastes was not related to the possibility of suffering injury or damage to their health, shipboard incinerators involve a number of physicochemical and health hazards to the person operating it (see also National Research Council 1996). The manual for the ship's incinerator included the following safety precautions:

- Do not open ash door or inspection cover before incinerator is cold;
- Voltage is 440 volts (personal contact with any hot wire could be fatal);
- Slag and ashes must be cooled before being removed manually from combustion chamber; and
- Materials fed into incinerator should not contain explosives or highly flammable liquids.

In spite of seafarers' familiarity with the ship's garbage management plan, there appeared to be some confusion among ratings about how to handle medical wastes. On both ships, the hospital was reportedly seldom used as most non-emergency cases were dealt with ashore and few emergency cases arose.

> *[…] But usually, we don't have these [first aid or medical treatment] cases. Normally we send them ashore for treatment unless it's really an emergency then we can do it. But since I came on board it's not happened. I hope not [laughs]. (Akwasi [deck officer 6])*

As such one would not expect any regular sharps, pathological or other infectious medical wastes from the ship. However, because minor injuries such as cuts and bruises are more likely to be dealt with by crew themselves, it is possible that some amount of waste which could be reasonably classed as hygiene or non-infectious medical waste ends up in the ship's garbage (see also National Research Council 1995). For example, during the shipboard interviews a number of deck ratings said they had come across items like plasters, cotton, gauze pads, and empty pill bottles and packaging while segregating garbage. Although some of the ratings said they handled these items in the same manner as the closest related general waste category (e.g. cotton for paper), the interpretation of "closest category" appeared to be open and varied considerably between seafarers. In the following excerpt, one deck rating hesitantly suggested cotton and plaster would be disposed of as plastic or paper:

Researcher: So when people do that and clean like small blood, small plaster, small cut. Do you see things like that inside when you segregate?

Yaw [deck rating 10]: Like waste cotton, yeah? […]We will put in what item this one [corresponding receptacle]; plastic or paper. So I don't know how to explain this.

On the contrary, his colleague said the waste was treated in the same way as rags.

Researcher: If you have like cotton; if I cut myself and clean my wound and put plaster. Then I remove and throw in my bin. When you are segregating, do you see things like that?

Kwame [deck rating 12]: We put in the same as the rags.

The procedure for handling such wastes also appeared to vary from ship to ship so that seafarers remained uncertain about the correct practice. According to another rating, outdated pharmaceuticals were usually disposed at sea on his previous ship but he couldn't remember what the practice was on his current ship. Although he was not familiar with procedures for disposing syringe and cotton, he believed such wastes were infectious and were to be handled with care.

Here in this ship, I don't remember but in my previous ship we throw it in open sea. […]No, we open it or break the medicine if it's in a bottle. […]We throw overboard this expired medicine but this syringe or cotton, I didn't experience it. But I think it should be handled properly because it's infectious. (Kwesi [deck rating 8])

The confusion among ratings about how to handle medical wastes on the ship suggests that the guidance provided in the ship's garbage management plan may have been inexplicit. Crew resorted to handling infrequent medical wastes in the same way as they would for "similar" wastes on the ship. However, this practice may pose a potential health risk on board particularly where infectious items are involved. A case in point is the disposal of medical waste from a regulatory drug and alcohol test for crew which was conducted in the ship's hospital. According to one rating, these had been handled as plastics.

For now, last using of hospital is when they came on board in Bahamas - drug and alcohol test. This plastic we were using for urine [specimen bags] we will put also with plastics in the garbage area. You know hospital room we are not using all the time. […] We had drug and alcohol test that's why we used that time. […]He [authorities] will give us like a cup and he will take this urine from the crew which one will have a drug and alcohol test. This urine will overlapse [elapse]. He will

throw into the toilet bowl and this plastic remains. He will pour it into the plastic. So all the plastics which remained, we also put into the garbage. (Yaw [deck rating 10])

There have been concerns about the risk of harm arising if ship wastes are improperly managed (see, for example, WHO 2001; WHO 2011[a]). Hygiene and medical wastes are potentially infectious with known public health risks for both the ship's population and shoreline communities (WHO 1999). The risk of infection could be very significant due to people living in close proximity and also with "strangers" coming aboard during port stays. One deck rating believed that he could be infected from handling the ship's garbage because it included waste from persons visiting the ship or contractors:

I think yes. Yes because it's not the garbage - it's not the only garbage from ship but sometimes it's the garbage from other people - from stevedores. So you don't know if they are sick or something. Or what they have. And then you are handling it. So I think there is a risk. (Kwesi [deck rating 8])

Exposure is also possible through the transfer of pathogens from storage of such wastes aboard ships or due to their unsafe disposal ashore (National Research Council 1996; WHO 2011[a]). For example, if other ships did not segregate well, and port reception facilities did not have appropriate control measures, crew bringing garbage to skips ashore might come into contact with it.

The process of handling and moving these wastes can be hazardous for shipboard personnel. In particular, there are considerable health risks for workers dealing with personal and hygiene wastes from the ship's accommodation (see also Prüss et al.1999; WHO 2010; WHO 2011[a]). Typical effects are skin and eye infections, and gastroenteritis (Health and Safety Executive 2009). Although the type of protection needed would largely depend on risks associated with the particular garbage type, best-practice guidance (see Prüss et al.1999, p. 141) recommends that protective gear such as coveralls; industrial aprons; leg protectors and/or industrial boots; and heavy-duty gloves must be worn by waste workers. It is also recommended that workers operating manually loaded incinerators wear protective face visors and helmets. In addition, dust masks are required for removal of ash and slag from the incinerator and for other operations that create dust (e.g. chipping and stripping).

Although the Company's risk assessment for garbage handling and disposal does identify personal injury hazards (see Table 5 in section 4.5.4), it does not provide for the use of personal protective equipment (PPE) as a control measure. The type of PPE required when performing garbage handling and disposal tasks on board was not specified in the Company's PPE matrix either (see Appendix 7). However, overalls, helmets, safety shoes and gloves were mandatory when working on deck; and the use of eye protection was recommended.

While seafarers acknowledged the risks involved, they were generally not concerned about health problems in relation to garbage management. According to one deck rating, he was not concerned about infection or sickness from sorting solid wastes on the ship because he had been doing this for a very long time and he always wore personal protective equipment when performing the task.

> *[...]I am not worried about it because as I have told you that is my job. Since I was bosun last 2007 I am in charge of this. […]For me, I am not exposed because when I segregate I must wear complete gear. Because I have mask; some filter inside, then you cannot smell. It is very important. (Tony [deck rating 6])*

Other seafarers who said there were no health risks involved with waste sorting attributed it to "familiarity" with the type of garbage they handled.

> *[…]Because you know this garbage; what kind of garbage you have in your cabin. Mostly you have plastic, tins for example, coca cola. And plastics for mineral water. I think it's not hazardous for us. (Yaw [deck rating 10])*

On board the ships, seafarers' risk preventing behaviours when managing garbage or carrying out related tasks could be inferred from how they said they dressed. Whereas some of them seemed confident just with a minimum of personal protective equipment when performing this task, others dressed to suit their own assessment of the hazards from the particular task. For one cadet, goggles were only necessary if he was working with anything he perceived as likely to cause harm or injury:

> *I just wear a pair of gloves. […]If it was something dangerous like some chemicals or something then I will put some goggles on if it's going to splash in your eyes. But most of the times, no. Just the gloves. (Koku [cadet 7])*

Another cadet said he only wore casual clothing when disposing personal garbage on deck, and that the use of masks was not really necessary for sorting garbage in the engine room because of the type of waste involved.

Paul [cadet 4]: Just my casual clothing, just empty the bins.

Researcher: What about when you are sorting say in the engine room? […]Were you wearing any gloves or anything?

Paul: Oh yeah, definitely.

Researcher: Any mask?

Paul: Um no but I don't really think you need it because it's mostly oily rags and things like that.

As it has been equally suggested in the preceding two excerpts, seafarers were more likely to wear gloves than other forms of PPE. However, divisions emerged for the use of masks among crew who were exposed to obnoxious smells when handling garbage. One deck rating said he wore masks in addition to gloves and coverall when segregating garbage because he was concerned about the smell.

Researcher: Do you feel that you are exposed to any risks; do you feel that you can fall sick or cut yourself or get contaminated? Do you worry about that?

Kofi [deck rating 11]: Yes I am worried [laughs]. Number one [covers his nose].

Researcher: So you wear mask to cover your nose. Do you wear gloves as well?

Kofi: Gloves and masks.

Researcher: Do you wear anything to cover your eyes?

Kofi: No, only the gloves and mask.

However, his colleague who also seemed concerned about noxious smells did not wear any.

Tim [cadet 1]: We wear gloves and coverall. […]Sometimes we smell especially in oily rags, we smell like diesel.

Researcher: And do you feel sick after; do you cough or anything?

Tim: No no.

Researcher: Do you wear anything on your face like a mask when you are sorting?

Tim: When we segregate, no. Just gloves and coverall.

Time was one of the factors influencing seafarers' decision whether or not to wear the appropriate PPE when managing garbage. Whereas handling the ship's aggregate garbage took hours:

> *[…] About 30 minutes, it's finished. If plenty, one hour. It takes a long time. The garbage was scrambled; plastics to papers. (Neil [deck rating 7])*

managing domestic waste from seafarers' cabins involved relatively less time:

> *Ah, almost two minutes, one minute. Because in our cabin we have only small garbage. (Kwame [deck rating 12])*

The inconsistent practices amongst crew members might suggest that these workers were not being provided with sufficient information and training on the potential hazards to their health when managing garbage.

When asked about how their work had been impacted by garbage management procedures and regulations, seafarers did not appear to be concerned by the changes to work associated with these developments. In the view of one deck officer, garbage management had been a requirement on ships prior to him beginning his career at sea. He said although it was now being enforced more strictly and had increased work on board, this was still an ordinary development for them.

> *[…] Since I commenced my seaman life this already existed. So it's nothing special for me. But about ten years ago maybe, no such action; no such strict regulations. So nowadays the seamen they have to do more work. But I think this is nothing special; just a normal way of working. […] Just normal work. Only we have to pay attention to take care of the environment. (Mark [deck officer 2])*

This view was shared by one rating who however argued that sorting waste was less intensive when compared with what he perceived to be more risky shipboard tasks. According to him, garbage management tasks were not as dangerous as working at height on cranes.

When I became a seaman nothing changed because I am on board ships that are very strict with these rules. I think it's like normal for me. […]Ah no [it's not too much work]. This is part of our work also. […]I think that it's not a big deal with the segregation because first there is the galley; they segregate first. We have to double check only. I think a small amount of garbage we have to segregate. Since I was OS [ordinary seaman] on other ships this has been my work. This is not very hard for me because I think I help for the safety of our environment and for me this is not a heavy-do job. It's only a small amount to transfer here, transfer there. It is not like climbing this crane and painting [laughs] which is more dangerous. (Zach [deck rating 5])

The preceding two quotes suggest that although managing garbage may increase work on board ships and expose crew to hazards, shipboard workers, who are used to continually adjusting to changes in their work environment imposed by different employers, do not perceive the task as additional work or risky.

5.1.3. Assessment

The findings presented in this section reveal that both managers and seafarers appreciated the need to comply with garbage management requirements. The procedures as required by MARPOL, and as laid out in the Company EMS were generally being practised on board the case study ships. However, seafarers' interpretation of these requirements differed considerably when operationalizing these. The analysis in effect demonstrated that managing garbage was an activity where the Company was struggling to get ship staff to adhere to guidelines for segregation and disposal. Managers believed that garbage-related incidents were primarily caused by seafarers' lack of education on environmentally-friendly practices.

Although seafarers generally appreciated the significance of safe behaviour when managing solid wastes, there were indications that crew were complacent and that they did not appreciate the full extent of risks associated with carrying out these tasks. The data point to evidence that shipboard personnel did not take the risks involved seriously as demonstrated by their attitude when using personal protective equipment. Seafarers' usage of personal protection was based on their individual perceptions of risk (that is whether the waste type handled was likely to cause harm or injury) rather than on the Company's PPE matrix or risk assessment – both of which did not sufficiently address this

either. In instances where protective gear was used at all, this was inconsistent with both company requirements and best practice.

The examples of variations in risk preventing behaviours among ship staff discussed in this section serve to illustrate gaps in seafarers' understandings of the ship garbage management plan. These examples further suggest that because some tasks in the garbage management plan were not being performed sufficiently frequently (e.g. the management hygiene and medical wastes), safety precautions might have been overlooked.

The use of personal protection among seafarers appeared to be purely discretionary. Gloves were the most commonly used method of protection when managing garbage. Masks were more likely to be used where ship staff considered the smell of garbage to be offensive. Even so, usage of any of the other recommended protection for garbage management activities (see Prüss et al.1999; see also PPE matrix in Appendix 7) was rare. This finding serves to illustrate that whenever seafarers used personal protection, they did so inconsistently. This might be because the company did not provide better hazard information in relation to garbage management or perhaps that ship staff were not taking the associated risks seriously. Problems associated with PPE use and unsafe behaviour are discussed further in chapter eight.

The findings demonstrate that there was no strong suggestion that seafarers' work had been affected by garbage management procedures and regulations. The evidence also suggests that no health problems were being experienced by seafarers from the fulfillment of environmental protection-related tasks on board the ship. However, as will be demonstrated in the discussion in chapter eight (see section 8.2), seafarers were reluctant to admit that they had been affected because they had accepted it as part of their job and also because they felt they had a moral obligation to protect the environment.

5.2. Sewage

The discharge of sewage from ships is regulated under Annex IV of MARPOL which prohibits the disposal of untreated sewage into the sea unless such discharge occurs beyond 12 nautical miles from shore. However, comminuted and disinfected sewage may be discharged at a distance of more than three nautical miles from land provided the ship is

fitted with an approved sewage treatment plant. Sewage can be classified as gray[47] water or black water. The definition of gray water can vary from jurisdiction to jurisdiction but generally includes (as defined in Regulation 1 (3) of MARPOL Annex IV) waste water from sinks, baths, showers, laundry and the galley. Under the same regulation, black water covers drainage from the ship's hospital, toilets and urinals, and cargo spaces including those containing live animals. For reasons of convenience and brevity, the discussion in this thesis will not make the distinction between the gray and black forms of sewage.

5.2.1. Managing Sewage: Managers' Perspectives

The Company had sewage plants installed on both the *Fair Winds* and the *Belle Mers* in accordance with Regulations 2 and 11 of MARPOL Annex IV. On one of the ships, the sewage system used fresh water (to reduce corrosion) whereas the other ship used vacuum flushing perhaps to reduce water consumption. On the latter ship, the estimated sewage generation rate was 1.15 cubic metres per day for the whole ship or 38 litres per day for each crew. According to the Company's procedures, sewage was normally treated on board using a disinfecting system, and then disposed at sea within the guidelines. However, there was a strong suggestion from managers regarding considerable differences in national enforcement standards (see also Hawkins 1984; Kagan 2005) when it came to the prevention of pollution from sewage, where some countries had adopted more stringent pollution control standards and regulatory methods. According to one manager, even where sewage had been treated on board, there were still varying restrictions in local requirements regarding its disposal:

> *Sewage, the ships have sewage plants which dispose of the sewage. […] And when the ship is in port, unless it's an approved sewage system, then the overboard must be closed and um everything generated is retained in a retention tank for disposal at sea.* […]*There are different local… some countries have local um requirements. Some have requirements that even if it's an approved sewage system it still has to be shut, um closed in port you know, inside the waters of that country. (Jimmy [onshore personnel 3])*

The main difficulty with managing sewage seemed to be with storage capacities. The holding tanks on ships were inadequate for storing sewage if the ship was going to stay

[47] Gray water is only classified as sewage under MARPOL when mixed with the drainages classified as black water.

long in port. According to managers, this was a big problem particularly in ports (Ukraine and Turkey) where additional local requirements for discharges applied. The problem was further exacerbated by the tendency on some ships for the sewage system to fill up more quickly. To cope with this, the Company had installed extra tanks on its ships. In the following extended quotation, one manager's view suggests that ship staff may have been affected because of regulatory inspectors' scepticism about the ship's compliance with sewage management requirements.

> *Harry [onshore personnel 1]: It's a huge, huge problem. We try to. We put it in the tanks which are not designed to hold it; we try to hold it on board, we… if the vessel is only in port for 24 hours which is minimize - people don't shower. It's very difficult to manage actually.*
>
> *Researcher: That must be difficult for crews; crew members on board, the restrictions…*
>
> *Harry: Yeah well, it's a huge, huge problem um... so for instance, I don't know if we've had it where ships, if they go in the shower, the shower will go down to the sewage system and then it fills up the sewage system very quickly. We've had people where they shower outside of the scupper; outside of the shower, goes direct overboard. But if that is found then you get fined - they fine you so it's a huge, huge problem. And ships are not designed to manage... Last year, I installed a 20 cubic metre tank - extra tank - and associate pipework. I've got the drawings and the plans and everything… Just to cope with that coz we had Afromax crude carriers going up to route regular and they were being fined every single… no matter how strict we were at minimizing it or not even putting any… As far as we were concerned we're not putting any, but the local regulators, they wouldn't believe it and then the ship was always fined.*

This combination of technical limitations with the ship's design (for collecting and storing sewage on board) and regulatory inspectors' scepticism may have resulted in anxiety among crew who were finding it difficult to comply with additional local requirements.

5.2.2. Managing Sewage: Seafarers' Perspectives

Sewage treatment was mainly the responsibility of the engine department although all crew members were expected to use toilet and related facilities on board with care. The sewage plant on one of the case study ships was designed for a fully biological operation based on an aerobic process and therefore, care had to be taken to ensure a successful treatment. For example, accidental introduction of any toxic substances would kill the micro-organisms responsible for the biological treatment process. Consequently,

the plant would lose its clarification efficiency and it would take another 4-10 days to renew the micro-organisms. Thus, treatment of sewage required the cooperation and participation of all on board. For example, the use of unapproved toilet cleaning agents and flushing of some items by crew was strictly prohibited. On one of the ships, a notice in my cabin read: "This vacuum toilet will not tolerate disposal of cigarette butts, common paper, plastic material, detergent etc. Only approved cleaning compound and toilet paper can be used."

The third (or fourth) engineer was responsible for maintenance of the sewage plant. During my stay on board, I was taken through the sewage treatment process and I also examined the manual for this equipment. One engine officer confirmed that the operation of the plant was fully automated and the only manual work involved was dosage and water control analyses:

> *Sewage we use a certificated [approved] unit and every time they [engine staff] discharge at sea, they put through this unit; through this huge plant. Sewage plant is working automatically, just the weekly maintenance; add some chlorine inside of the dosing tanks and automatically dosing every discharge overboard. This chemical goes inside the number 4 chamber. Once disinfected, sewage goes overboard. Before it does, there is some separation – slightly complicated. (Kwabena [engine officer 3])*

This does suggest that unlike other environmental management activities on board the ship, sewage management would be less likely to have workload implications for ship staff. However, according to another engineer, the process did involve some effort on the part of crew responsible for performing the task – routine calculations such as the levels of chlorine excess and suspended solids:

> *But also we are taking analysis for this water: how many ppm [parts per million] in this one required [effluent quality e.g. suspended solids, Coliform count, etc.]. So there is a form also. In my last ship you must take some analyses: water is good or not before you discharge. (Fiifi [engine officer 4])*

These control checks had to be carried out to ensure that the discharge of sewage into the sea met the criteria set by international standards, such as MARPOL and the United States Coast Guard (USCG) requirements. These checks did not end with discharge requirements. According to one engineer, the crew had to ensure that a number of physical control measures were in place and that sewage was stored in the appropriate tanks prior to

calling at strict ports, such as in the United States, and this was putting them under a lot of pressure.

> *Researcher: So are you like under pressure when you are going to America; a lot of work?*
>
> *Fiifi: Ah yeah, yeah. We are preparing this one: all the overboard valves; discharge and put pad lock. Especially this sewage must be in the sewage tank, not overboard. Padlock everything and then it must be secured. (Fiifi [engine officer 4])*

Ship staff confirmed managers' concerns about insufficient capacity for holding treated sewage on board. According to them, this mostly happened during unanticipated long port stays, and also in ports where local requirements did not allow the discharge of sewage in any form. In the following quotation, one shipboard participant's view suggests seafarers' acceptance of the practice of holding sewage in non-designated tanks on board the ship as a temporary measure for coping with the situation.

> *Fiifi [engine officer 4]: Even treated you are not allowed in port. We must close the overboard and put lock. But when at sea you can open and discharge. But this is already treated.*
>
> *Researcher: So do you have enough space to store even when you are in port?*
>
> *Fiifi: When water is already plenty [full tank] we can put to after-peak tank (sic). I know I did this one because as we are coming alongside it was already full. So this is water. So we put this in after-peak tank.*
>
> *Researcher: That's the treated sewage?*
>
> *Fiifi: Yes.*
>
> *Researcher: And then you can use your toilet and everything as normal.*
>
> *Fiifi: So that operation will be continuing. Otherwise where you put this your [sewage]? It will smell [laughs].*

However, there were indications that ship staff were not satisfied with the practice of retaining sewage on board in this way. In the Master's review of the environmental management system (EMS) for the *Fair Winds*, a concern was raised about the ship's inability to comply with local environmental requirements because the vessel had not been fitted with dedicated gray water holding tanks. According to the review, strict rules in Turkish ports meant that no discharges could go overboard. The Master was concerned

that retaining too much sewage on board in an attempt to comply with local requirements was compromising safety of the ship and its cargo.

> *Another point of concern is water damage of containers in hold which allegedly took place on board [mentions date]. Now quite difficult to say what was the real reason but from my experience when vessel is under operation in Turkish ports where very strict rules for discharging any waters (grey, bilge, sewage, ballast) apply. In case of heavy rains when amount of waters collecting in bilge holds we have to discharge them overboard as there isn't any dedicated bilge holding tank in order to safeguard cargo. But from another side particularly in Turkey this operation is illegal. So there is conflict between local environmental legal rules (sic) and vessel's capability to comply them (sic). The same situation with the grey waters discharging which on board directly overboard that again against local Turkish rules but the vessel is in compliance with MARPOL for 100% (vessel just isn't fitted with dedicated collecting tank for grey waters). Presently Master is in quite tricky situation when need to safely balance between two obligations. My opinion it's (sic) would be good to include in EMS clear procedure how to handle these situations in order to avoid unnecessary disturbance, fines etc. (Fair Winds, [Master's review of the EMS])*

According to one deck officer, to address this situation the Company had modified the ship's gray water system and gray water was being collected into the aft-peak tank.

> *[…] only one port in rotation [voyage] we have where it's not allowed to discharge via the plant let's say in the waters into the harbour area, is Mersin. To keep this particular rule so we collect it - all these waters to the up-peak tanks (sic). The system was updated or let's say reconstructed and after Mersin we discharge when we have availability to discharge into the sea. (Fred [deck officer 1])*

5.2.3. Assessment

The analysis in this section has demonstrated that the process of collecting, treating and disposing sewage was generally being adhered to at *Taf Shipmanagement*. The findings implicitly highlight a strong relationship between the perspectives of managers and seafarers in relation to compliance with regulations for the prevention of pollution by sewage from ships. The results show that managers were aware of limitations in holding capacities on board arising out of regulatory complexities in the different jurisdictions where the ships were trading. Managers were thus aware that seafarers were experiencing difficulties with complying in ports where the local requirements were very strict. The Company had therefore ensured that extra tanks were fitted or allocated on the ships to help crew cope with unanticipated demands. While this might mean that work processes

which would assist the crew to better protect the environment were being supported by the Company, there might be workload implications and the associated fatigue for ship staff in the time that this would be taking for the Company to resolve such practical difficulties identified by crew.

The findings also suggest that although managing sewage is a largely automated process on board ships, seafarers can experience anxiety in the process of finding temporary solutions to cope with unplanned waste capacity limitations in countries where no discharges are permitted, and while taking similar measures to prevent the Company from being fined. However, the potential for experiencing such psychological stress is not limited to sewage management on board ships. The issue of anxiety and psychosocial stress is further explored in the analysis under management control (see chapter seven later in this thesis) and in the discussion in chapter eight.

5.3. Ballast Water

Ballast water is important for controlling stability and stress in relation to a ship's structure. For example, during loading and discharge operations, it may become necessary to adjust the trim and draught of the vessel. The ship might list during cargo operations or navigation in adverse weather conditions and this would also require regulating ballast. Ballast water may contain organisms or pathogens whose geographical transfer could impair biological diversity or interfere with the physical environment and affect human health (see section 1.1). Although bulk carriers and tanker ships tend to carry more ballast water than container ships[48], studies have confirmed that ballast water from container ships can be a major source for the introduction of exotic species (Chu et al. 1997; Zhang and Dickman 1999). Because of this need to manage ballast water, ships are required by law to have a ballast water management plan. These plans are ship specific and describe the main ballast water management methods used on the ship, and operational procedures.

[48] Modern container ships are fitted with automatic heeling tanks which tend to maintain the ballast internally during cargo operations.

5.3.1. Control and Management of Ships' Ballast Water: Managers' Perspectives

The Company was taking steps to reduce the transfer of unwanted aquatic organisms from the ballasting activities of its ships. All vessels in its fleet had a ship specific ballast water management plan on board. In addition, the plans on those *Taf Shipmanagement* vessels trading to Brazil had been Class[49] approved. Although the regulations requiring ships to have Class approved ballast water management plans were not in force worldwide at the time of conducting this study, restrictions were already applicable in some parts of the world. According to managers, the Company was in the process of developing Class approved plans for managing ballast water on all ships within its fleet. One manager explained that the Company was unable to have its ships call at ports in Norway and Brazil, which were already enforcing the regulations, without approved ballast water management plans:

> *Well scenario at the moment is we're not allowed to call any Norwegian ports or Brazilian ports without a Class [classification society] approved ballast water manual plan on board which obviously adds pressure to us to get them approved by Class. (Warren [onshore personnel 6])*

Getting Class approval for ships' ballast water management plans required the Company to actually carry out ballast transfers on the ships concerned. Managers recognized that the process of exchanging ballast itself required some amount of time and planning. For example, on attempting to get one vessel carry out a test transfer, one shore-based staff member was faced with crew complaints about hours of rest:

> *To get them Class approved you have to have a ballast exchange plan, which is basically the vessel has to transfer ballast or exchange it to get rid of the ballast that they have and take the new ballast. And one of the captains just said: "Whoa! There is not a chance I can do that at the moment. I'm far too busy." He was on short trade voyages and he said no; he basically turned round to me and said: "No if I do that I would get no sleep." So yeah, I mean it must affect them quite a bit. (Warren [onshore personnel 6])*

There were also concerns that forthcoming legislation on ballast water in some trading regions might be difficult for the Company to achieve. Some of these additional local requirements were perceived by managers as detailed, complex and uncertain so that ship

[49] Classification society; see explanatory note in chapter one.

operators would almost always be in breach of some provision (see also Aoki et al. 2000). In the view of one onshore participant, the guidelines for ballast water management in the United States were a lot stricter and not capable of being done when compared with EU guidelines:

> *[…] another huge problem we have is the US - the guidelines that they have in specific states are a thousand times more strict compared to EU guidelines, um which is going to cause huge problems in the future. Especially in New York because at the moment on the environmental side obviously the ballast water management; the invasion of the species - New York's guidelines are impossible. You can't actually fulfil them. (Warren [onshore personnel 6])*

At the time of conducting this study, one of the methods used by some of the Company's ships was the flow-through method, which involves volumetric exchange of ballast. This method consists of pumping the new ballast into the existing ballast and overflowing whilst underway so that after a period of time the tank has been flushed through of the old ballast three times. For example, if the ship's pump has a flow rate of 250 tonnes an hour, a 500-tonne tank would be overflown for at least six hours to ensure that the ship's ballast water had been changed three times in accordance with the regulations. However, the problem with this method was that many voyages were too short to complete the process. In the following quotation, one manager explained that volumetric exchange of ballast was difficult to achieve particularly in cases where the trading route allowed little time between port calls:

> *But you have to produce work your when you starting pumping that tank, when you stopped pumping that tank, and it's like your certificate you have to do and um it's ridiculous really certainly on short sea voyages where you wouldn't have time to do that. It's not very feasible. […] On a big ship on a transpacific route there is plenty time to overflow the ballast or pump that tank out, refill it with clean sea water and then go into... But a ship with two days between ports to change its ballast water is ridiculous. (Martin [onshore personnel 4])*

Expected legislation[50] on ballast water quality and discharge standards envisages a variety of shipboard control mechanisms and abatement technology for ballast water. These include chemical (e.g. additives or de-oxygenation), mechanical (e.g. screens or filters) and physical (e.g. sonic and ultraviolet radiation) treatment options (see Lloyd's

[50] Regulation D-2 of the Ballast Water Convention. At the time of writing, the Convention was not yet in force internationally.

Register 2010). Part of the problem with the myriad of proposed treatment options is their practicality. Some of them may present additional maintenance requirements for ship crews. For example, chemical additives and sonic treatment options can increase tank corrosion and other structural damages. It was further suggested by managers in this study that the crew might have to undergo extensive training to ensure they are familiar with the operation and maintenance of new systems.

5.3.2. Control and Management of Ships' Ballast Water: Seafarers' Perspectives

On the ship, the Chief Officer was in charge of ballast water management and was responsible for ensuring that the ballast water record book and relevant documentation were maintained correctly. Seafarers confirmed that the ship had a ballast management plan in place and that ballast was being exchanged within the guidelines to prevent the geographical transfer of invasive aquatic species. However, according to one deck officer, they were not yet carrying out the ballast water treatment option because there were no legal requirements to do so on this particular trading route and the ship had not been resourced with the requisite equipment:

> *The ballast water we also have; yeah this is ballast water management plan. [sighs] That's a lot of rules here. Some countries or ports have specific rules for the ballast water treatment. We have no special equipment. It's just regulation and IMO convention - Regulation 276A if I don't mistake or 267A. […]Normally on our line we don't do it because there was only one port in Izmir- it was cancelled. That is why for us there is no limitation on ballast water treatment. (Fred [deck officer 1])*

The Chief Officer was assisted by a number of deck ratings in implementing the plan, usually the Bosun and an Able Seaman (AB) for the pumping operations and regular tank soundings. Engine crew only played a support role by assisting with any operational and maintenance requirements for the hydraulic wells and pumps which formed part of the system for ballast uptake and discharge. One engineer explained:

> *This is [for] chief mate [chief officer]; I only check hydraulic wells ballast. All the engine crew don't have responsibility for this - it's only deck crew business. […]Yes this is mine - the hydraulic wells. I must keep in working position [order]. If some problem, chief mate call me "We have problem: it doesn't open or it doesn't close some wells." I start repair work. (Ben [engine officer 1])*

Ship staff experienced anxiety when complying with the ship's ballast exchange plan in some ports because they were aware of the presence of informants who would report them to the authorities in the event that they did not comply. According to one deck rating, a contrast in the colour of the discharge would be easily spotted by stevedores in port as evidence that the ship had not complied:

> *[…]Because some ports are river and river is not so good water. So when you discharge maybe authorities will say: "Ah!" Let's say their water is very clear and then you discharge waster from the river - it is different colour; like muddy water. Because some stevedores also they make report and then when authority comes sometimes they will pay these stevedores because they are also let's say like...Because some countries, some authorities they give present [reward] to anybody who catches another doing something not proper. They [stevedores] are also concerned because they belong also to this country you know. (Tony [deck rating 6])*

While this deck rating said that he had not personally experienced stevedores reporting ballast water pollution by the ship's crew in port, he nevertheless confirmed that ship staff deliberately avoided overflowing ballast to eliminate the risk of contaminating the ballast water with oil on deck.

> *Researcher: Has this [whistle-blowing] happened anywhere since you started working?*
>
> *Tony: No it never happened since I work because let's say ballast; we never overflow this ballast because some oil on the main deck, you don't know, came from the container. You know some container also have oil inside and then this oil drums start leaking and if you overflow all oil on deck...*

During the process of ballast exchange using the flow-through method, ballast water can accidentally overflow on deck and become contaminated in this way. For example, ships have been fined for unintentionally allowing ballast water contaminated with traces of oil and other substances to go overboard (see The Nautical Institute 2008).

Seafarers shared managers' perceptions about national differences in enforcement styles on ballast water discharge standards. On both ships, the crew reported that some countries had stricter requirements and others had additional requirements so that ballast water could not be topped up or discharged in their ports even when the ship had already exchanged ballast.

Yes, yes of course. Ballast we cannot just exchange ballast. There is special regulation but normally it's chief officer who is in charge of this. But I know in special areas you cannot just change ballast; also in US and Europe; Australia also same. That's why in America, before you enter US water, when you are carrying ballast you have to exchange when you enter the US water. First throw your ballast and then you are still on high seas so you have to change. They don't want this [pause] let's say you get this...You cannot enter unless you change your ballast water. But once you are, especially for some ports, they have a special regulation: you cannot top up or discharge ballast. […] (Akwasi [deck officer 6])

Just like managers, seafarers perceived the method of managing ballast on the ship as time-consuming. However, divisions emerged between deck and engine staff about the inability of ship staff to carry out the requirements. The following explanation by one deck crew member suggests that the difficulty with fulfilling ballast exchange requirements on the ship had to do with time and the size of the ship:

I have been trading in Europe to Brazil before and this chief mate [chief officer] is sending me to change the water in the ballast tank. […] Because as I can remember, it takes me a lot of time because it's a large ship. Because we have to pump out one and then load the second. It takes a day or half a day I don't know. But it takes too long. (Kwesi [deck rating 8])

Although his colleague in the engine department confirmed the time limitations, he however attributed failure to fulfill the requirement to laziness on the part of designated staff:

I'm not sure but I only learnt that when entering in America you must declare. Because some chief mate [chief officer] they are lazy to change sometimes you know, because it's too much time for this: take out and then this. But sometimes they make only overflow. [...](Fiifi [engine officer 4])

The above quotations serve to illustrate that seafarers were experiencing company environmental programmes in relation to ballast water management as difficult to fulfill and stressful.

5.3.3. Assessment

The findings in this section show that there was consensus in the manner in which managers and seafarers interpreted requirements for controlling and managing ballast water from the Company's ships. Managers suggested that regulations on ballast water management were difficult for crew to achieve and that requirements coming into force were going to increase work demands on board, with extra training and maintenance requirements for crew. Seafarers had expressed concerns about ballast water management procedures and those who did, believed that the process was time-consuming and causing anxiety. Managing ballast on board the ship is a specialist activity. Therefore, the inclusion of more participants with direct responsibility for performing the task (e.g. Chief Officers and some Deck Ratings) in the study would be likely to shed more light on how work on board is impacted when complying with ballast water management procedures and regulations.

The accounts of seafarers as demonstrated in the analysis in this section rather suggest that seafarers had not experienced as much psychosocial stress from stricter requirements for fulfilling ballast water management as they did in the case of managing sewage. This might be because fines were not being applied to vessels so frequently. It might also be that because the regulations on ballast water management were not yet in force, ballast exchange was not taking place frequently on ships or that the procedure was not being followed. The analysis of the Company's environmental footprint in chapter four (see sections 4.2 and 4.3) shows very low ballast water management figures for the entire fleet and there was no data for both case study ships in 2011. According to the Company, where ships had no data on ballast management this was either because they had not performed the operation or had simply not recorded it. Another possible explanation for the limited evidence could be due to the trading region of the ships. For example, on one vessel ballast was not exchanged whenever the ship was operating in North European waters. The analysis in chapter seven and the discussion in chapter eight will explore the potential for psychosocial stress further in relation to the performance of environmental protection-related tasks.

5.4. Concluding Observations

The findings presented in this chapter when considered collectively show that both managers and seafarers in the case study had a common understanding of the requirements and procedures for managing ship-source pollution from garbage, sewage and ballast water as provided for by relevant international regulations, and also in accordance with the Company's environmental management system (EMS). It has demonstrated particularly strong correlations between the views of managers and seafarers regarding the management of sewage and ballast water aboard the case study ships.

The analysis under sewage and ballast water highlights concerns about anxiety from seafarers' fulfilment of relevant tasks. In spite of the largely automated nature of the process involved in managing these waste streams, sewage and ballast water are still important areas of concern for ship staff. However, only a small number of crew are involved in the management of sewage and ballast water on container ships, and knowledge on how seafarers might have been affected in the process could be improved through a sampling strategy that includes more seafarers in this category. Knowledge could also be improved through a documentary analysis of manufacturers' instructions for equipment used when managing such waste streams. For example, it is obvious from the Company's risk assessment that personal injuries and even fatalities can result from the operation of ballast handling equipment and sewage plants (see section 4.5.4).

Besides similarities in the understandings of seafarers and managers, the findings further demonstrated that seafarers' interpretation of environmental requirements differed considerably when operationalizing these. This difference was evident in the analysis under garbage management. The analysis in effect demonstrated that seafarers underestimated the hazards associated with managing garbage on board the ship. This was noticeable in their attitudes towards the use of personal protective equipment (PPE) when fulfilling garbage management tasks. The data suggests that the decision whether or not to wear personal protection was based on seafarers' own risk assessment and PPE usage was generally inconsistent.

Whereas managers blamed seafarers' inability to comply with the ship's garbage management plan on their lack of education, there was no provision for the use of personal protection in both the Company's PPE matrix and in risk assessments for shipboard

activities associated with garbage management. The findings thus suggest that seafarers had not been provided with sufficient information and training to minimize the risk of harm from potential hazards associated with managing garbage.

Although ship staff mostly interpreted activities relating to sewage and ballast water management as affecting their work negatively, they did not generally perceive complying with the ship's garbage management plan in the same way. Seafarers reluctantly acknowledged the work demands and health risks associated with sorting waste on the ship but there was no strong suggestion that this was something that bothered them.

CHAPTER SIX: MANAGING CONTAINER SHIP SOURCE POLLUTION AND SHIPBOARD PRACTICE: OIL AND ATMOSPHERIC POLLUTION

6.0. Introduction

This second findings chapter examines the fulfilment of environmental requirements relating to oil and atmospheric pollution. Using the same analytical approach as in the previous chapter (chapter 5), this chapter will examine the perceptions of managers and seafarers regarding the Company's environmental programmes in relation to atmospheric and oil pollution prevention on board the ship. In exploring matching or divergent perceptions of the impact of environmental compliance on seafarers' work and wellbeing, amongst shipboard and shore-based personnel at the Company, the objective is to determine whether the practice of complying with environmental requirements had affected the work experience on board the ship. In the analysis, I will demonstrate that although both seafarers and managers had a similar understanding of company requirements regarding the control of ship emissions and the management of oily wastes, there was some indication that activities relating to pollution prevention during bunkering and fuel changeover operations were areas of concern for ship staff.

This chapter therefore argues that for both environmental programmes, the experience of stress was more strongly felt among staff in the engine department who were fatigued from longer working hours.

The analysis in this chapter is structured into two sections. Section one deals with procedures for managing oil and oily wastes, and the second section examines the requirements relating to the control of emissions from container ships. An outline of the regulatory requirements is presented at the beginning of each section. This is then followed by an analysis of managers' and of seafarers' perceptions about what compliance entails, and whether both groups of participants feel that there are any risks involved for ship staff.

6.1. Oil and Oily Wastes

Oil as defined in Regulation 1 (1) of MARPOL Annex I includes crude oil, fuel oil, sludge, oil refuse and refined products. It excludes petrochemicals which are dealt with separately under MARPOL Annex II. Unlike requirements for managing garbage and sewage, regulations which address the prevention of pollution by oil vary in scope depending on whether the ship is carrying oil cargo in bulk or not. For container ships, key areas of concern are activities relating to: (1) the transfer of oil in machinery spaces; (2) bunkering operations; and (3) the prevention of pollution from oil spills on deck (e.g. leaks from containerized cargo and grease or lubricating oil from the ship's cranes). Accordingly, the discussion in this section will focus on these three areas.

6.1.1. Managing Oil and Oily Wastes: Managers' Perspectives

Container ships have waste streams from their machinery spaces that contain sludge, waste oil and oily water mixtures. Sludge is produced during the purification of fuel and lubricating oils on board the ship. This is a continuous process to remove impurities and eliminate other contaminants that are formed during combustion. Sludge can also be derived from the accumulation of bilge water – a mixture of water, oily fluids and similar wastes – from mechanical and operational sources (e.g. boilers, equipment such as the oily water separator, and wastewater) in the ship's machinery spaces. On larger vessels, the production of sludge derived from fuel oil can be up to 2 per cent of the ship's heavy fuel oil consumption (US Environmental Protection Agency 2008). Bilge water production rates are not constant and could vary depending on the ship's age and the associated maintenance requirements. On the older of the case study ships, about 0.5 cubic metres of sludge and 0.8 cubic metres of bilge water was accumulated in the engine room daily.

According to the Company's procedures, sludge was drained into a dedicated holding tank (in accordance with Regulation 12 (1) of MARPOL Annex I) where it was retained on board for incineration or off-loaded to a waste reception facility in port. The Company managed bilge water in two ways. First, bilge water was pumped out of the bilge spaces into a holding tank where it was retained on board prior to being discharged to a reception facility ashore. The second way was by treating bilge water using an oily water separator. The treated water was then discharged overboard within the guidelines set by Regulation 15 of MARPOL Annex I. According to this regulation, bilge water may be

discharged overboard if the oil content of the effluent does not exceed 15 parts per million (ppm). In the following description by one manager, treating bilge water requires passing it through oil-filtering equipment which monitors the oil content and restricts discharges that do not meet this criterion:

> *[…] any oil residue we can drain off and collect again to the…and then we put it to through the oily water separator. And then, we've got a 15 ppm [parts per million] alarm you know. So the maximum parts per million you're allowed to discharge overboard is 15 ppm and I believe there's no legislation coming out to bring it down even more. And um so again you've got what they call a three-way valve operate so if the oil content does go up, automatically a solenoid valve will close the overboard and then that will recycle and, until the water is sufficiently clean to go overboard. (Bill [onshore personnel 2])*

In general, the Company's procedures required that a number of records be kept at each stage of all operations involving the transfer of oil in machinery spaces in order to account for these oil residues (refer to chapter seven for details). The Chief Engineer was assigned overall responsibility for these operations.

The process of refueling ships, also known as bunkering, is another important area requiring prudent management in order to prevent pollution. The Chief Engineer was in charge of planning this operation through completion of a risk assessment and a bunkering checklist. Examples of basic check points covered in the preparation include: deployment of fire-fighting equipment and materials for oil spill containment and clean-up on site (e.g. dispersants, granules and absorbent pads); plugging of deck drainage with scupper plugs; securing of save-all trays in areas of hose connection; and closure of valves for manifolds not in use. Quite similar to garbage management procedures, shipboard personnel were assigned specific duties and positions for bunkering operations. For example, the Third Officer was responsible for maintaining communication with the bunker supplier; monitoring the hose connection for any leakage; and alerting and mobilizing all crew for clean-up. His duty post was at the manifold in use. The third (or fourth) engineer was responsible for confirming the inflow of oil into the prescribed tank (to minimize tank overflow).

Common incidents during bunkering are spills from splits in the hose connection or breaking of the flange of the connection. Procedures for dealing with these were covered in the Shipboard Oil Pollution Emergency Plan (SOPEP) for which every crew member on

board had a designated role. In the view of one manager, the response required a lot of effort from the ship's crew:

> *Well bunkering. There's a classic one where you get the majority of [pause], problems can occur you know. If you have to defuel a fuel tank you've got fuel all over the deck, maybe in the harbour you know, and this is not intentional I can assure you because it's a work… you know it means a lot for all the crew to clean it up. But it does happen, occasionally… (Bill [onshore personnel 2])*

According to managers, one of the difficulties with managing oily wastes was the unavailability of shore reception facilities (see also De La Fayette 2008; Abou-Elkawam 2011). For ships trading on routes where there are limited facilities for disposal of such wastes, prudent management and monitoring of storage capacity were imperative. Port state control inspections have identified cases of seafarers using tanks not recognized by the ship's International Oil Pollution Prevention (IOPP) Certificate, to hold sludge beyond approved capacities on board. Tanks designated for oily residues have also been found at near or maximum capacity and therefore inadequate for the ship's intended voyage (see, for example, Drouin 2009). The challenge for managers was getting the crew to advise the Company about specific oily waste disposal needs rather than retaining these wastes inappropriately on board:

> *So that's the only thing that I've found when I've gone on board and maybe found some receptacles stuffed full of oily waste […] because the ship's been running between two ports where they don't accept it as routine. But these ports you know, for a fee everything is disposable and it's just educating the guys into realizing that "Let us know, we'll arrange the disposal and arrange the cost". (Jimmy [onshore personnel 3])*

6.1.2. Managing Oil and Oily Wastes: Seafarers' Perspectives

On board the ships, the crew were involved in various oil pollution prevention-related activities. Tank sounding and bilge pumping was the responsibility of engine ratings and cadets. The Chief Cook was responsible for oily wastes from the galley and these were held in gallons before being transferred to the sludge tank in the engine room. During one of my engine room visits on the one vessel, I learnt that sludge was not incinerated on this ship. The duty engineer had said: *"We are very busy on this ship and sludge need (sic) a lot of preparation like removing the water through evaporation and heating the sludge and*

mixing it with diesel to help ignite it," and so they simply discharged it in port (*Diary, 14th June 2011 [Day 10]*).

The disposal of sludge ashore, nevertheless, required some preparation prior to the operation; for example, gasket making to secure hose connections against any spillage. Additionally, sludge had to be heated to lower the viscosity and facilitate flow during pumping ashore. According to one cadet, the process of transferring sludge ashore itself could take up to four hours:

> *Researcher: How long does it take to discharge sludge?*
>
> *Asante [Cadet 6]: It depends upon the volume of the sludge.*
>
> *Researcher: On the average or like last time in Haiti, how long did it take us? Were you on duty then?*
>
> *Asante: Yes. We started ten, we ended up one o'clock or two. Three to four hours.*

The duration of the process also depended on the size and condition of the equipment provided by shore reception facilities. Because smaller hose pipes allowed for a much slower rate of discharge, crew did not only spend more time performing the task but also had to be careful not to break the connection and cause a spill. In the following quotation, one engineer expressed his discontent about using smaller and defective hoses:

> *[…] It depends upon the size of the hose because sometimes we are given small and I cannot make more pressure otherwise you make pollution outside. You will break the hose [laughs]. That's why I am always observing [monitoring] the other hose condition because some truck [road tanker] they are crazy. They bring hoses which are not good - what is this! (Fiifi [engine officer 4])*

This quote suggests the process of discharging sludge ashore may be stressful for seafarers who appear to carry the responsibility for making sure oil spills are avoided but who do not retain full control of the resources used in the process.

Prevention of pollution during bunkering appeared to be a particularly intensive activity and there were indications that crew found it hard to perform the tasks that were required for this operation given current staffing levels. Ship staff were involved in a variety of roles when planning and carrying out bunkering operations. According to one trainee

officer, pollution prevention measures included preparing oil spill clean-up equipment and working out the volumes to be pumped into specific tanks.

> *Before we start bunkering we must prepare all the equipment like SOPEP (sic) equipment, anything; fire hose, in case of emergency some booms. And before they start they calculate it with 4th engineer going there so that they could know the exact transferring of bunker fuels. […] they calculate; sounding of the tanks before transferring and then after transferring sounding again of the tanks. (Serge [cadet 2])*

Another crew member added that the prevention of pollution during bunkering also required plugging the drainage on deck and monitoring the actions of the suppliers.

> *Sometimes they tell us to cover the hole; put some scupper plugs. Then sometimes look out; watch what they're doing [suppliers] about transferring the bunkers. (Seth [deck rating 13])*

However, in the view of one deck officer, because crew members were assigned more than one duty in different locations during bunkering, working in this way was not practically feasible considering staffing levels, and that the entire operation was at risk of a pollution incident:

> *For example, especially during the bunkering operation, they assign one personnel should be here, [another] personnel should be here. Yes according to the code it's correct. But in practical circumstances the personnel among manning [staffing] is sometimes not enough. So only one person has to take care of two places. Normally it should be two persons […] But due to the manning scarcity [inadequate staffing] only one person has to take care of two places. So when he is taking one place, maybe another place is at risk of some accident, pollution or something like that. (Mark [deck officer 2])*

Once again, this quote suggests that stress may be induced in processes where seafarers are responsible for oil pollution incidents but do not have the resources to carry out these responsibilities optimally.

There was also the feeling that activities related to pollution prevention during bunkering operations were too many and time-consuming. One engine officer said the amount of time it took could have been used for performing other tasks on the ship, suggesting that crew were being overburdened:

> *It's time - about three persons have to prepare some lines; prepare to be standby near the hoses; another guy should be preparing the lines, discharge. You look, it's plenty job. Maybe about 12 hours total working hours taken for this procedure. They can use it for maintenance of the engine. Also bunkering preparation also has too many items [tasks]: we have to prepare, close everything, and check. It also takes time. After that, all these equipment which are necessary for bunkering are again put back to the storage position and that also takes time. (Kwabena [engine officer 3])*

To take the above seafarer's concern about the impact on shipboard workers further, the amount of effort required from pollution prevention during bunkering may best be exemplified by an incident resulting in a significant spill. One deck rating described his experience of cleaning up a bunker spill equivalent to about six drums in volume, and which may have caused a major pollution incident had the spill not been promptly contained or perhaps resulted in other problems for the ship's crew had any stevedores witnessed[51] the incident.

> *I have experience before. When they are transferring bunker they didn't...already flowing. But we [were] lucky because we [could] protect immediately; all crew. During my bulk carrier [company's name] before. But we are lucky because [it did] not [go] overboard. We collect to the drums. It happened in Brazil, Rio de Janeiro. We are lucky because [it happened] during night time and no stevedores on board. Captain he is lucky. Maybe we collect six drums of bunker. (Nick [deck rating 2])*

Apart from bunkering, oil spills on deck also occurred from cargo leakages. Examples of items that were reported by crew to have leaked on board the case study ships include hydraulic oil from car cargoes, and containerized oil products which participants could not readily identify. The most common cause of minor spills on deck was from the activities of stevedores. The use of cranes for cargo operations during port stays often left spots of oil on deck. One deck rating explained that they had to clean these first before washing the deck in order to avoiding discharging oily water overboard during deck washings or by run-off in the event of rainfall:

[51] According to my interviews, stevedores were reported to play the role of "informants" for the regulatory authorities in port. See also the analysis on management control in chapter seven.

Because if there is grease, we must wipe first with rags using thinner - not so strong thinner - we clean first to remove this grease because if you clean this one will scatter and then the water will become oily. […] When we wash on deck, first I will assign a guy to take out first this grease on deck. Especially we are working on a container ship - some gantry crane grease falls down [drops] so we must clean first by rags and then thinner. (Tony [deck rating 6])

However, apart from the effort which goes with taking care to remove oil pollutants on deck, this finding suggests that seafarers could also be at risk of coming into contact with oily residues and solvents when cleaning up such small spills. The potential and extent of such exposure to hazardous substances from the fulfillment of environmental protection-related tasks is explored in the discussion in chapter eight (see section 8.2).

6.1.3. Assessment

This section has shown that managers and seafarers in the Company had a similar understanding of requirements for managing oily wastes as laid out in MARPOL and in the Company environmental management system (EMS). Managers believed that seafarers had been given the necessary support to mitigate the risks of incidents relating to oil pollution, and that the crew had been sensitized to advise the shore management about specific oily waste disposal needs rather than attempt to deal with it themselves. The data suggest that seafarers were finding activities relating to oil pollution prevention overburdening, stressful and time-consuming. This might be because the Company had not provided the correct level of support which the crew needed to be able to implement the environmental programmes on board the ship.

The findings do highlight the fact that while company measures to prevent the occurrence of oil pollution incidents on board can only be effective if ship staff implement these correctly, seafarers can, nevertheless, experience the process as stressful in instances where resources are inadequate to enable them to better protect the environment. The issue about whether or not resources were a problem at the Company requires further discussion.

6.2. Air Pollution and Emissions

Regulations for controlling air pollution and emissions from ships are covered in Annex VI of MARPOL. Regulations 12-16 address various forms and sources of air pollution including ozone-depleting substances such as halons and chlorofluorocarbons (CFCs). The regulations also prohibit the incineration of certain products on ships, such as contaminated packaging materials, polychlorinated biphenyls (PCBs) and garbage containing heavy metals. Regulations controlling the emission of volatile organic compounds (VOCs) only apply to tankers. At the time of writing, additional regulations were being considered in the area of greenhouse gas (GHG) emissions (see IMO 2011). Taken together, the more widely applicable requirements for controlling emissions from ships are concerned with Nitrogen oxides and Sulphur oxides. For convenience, the analysis in this section will be largely concerned with measures to reduce Nitrogen and Sulphur oxides (NOx and SOx) from ships.

NOx emission limits on ships are applied in proportion to the engine maximum operating speed. At the time of conducting this study, the allowable limits for emission of nitrogen oxides from ships' engines was 17.0 grams per kilowatt hour (kWh) for ships with a maximum engine operating speed of less than 130 revolutions per minute (rpm); and 9.8 grams per kWh for ships with an engine speed of 2000 rpm or more. These limits are known as Tier 1 standards established by the International Maritime Organization (IMO) and apply to engines installed on ships constructed on or after 1st January 2000, or ships which undergo a major engine conversion after this date. Higher NOx emissions standards (Tier 2 and Tier 3) apply to ships built from January 2011 onwards. Ships whose engines meet these limits can reduce NOx emissions by between 15 and 80 per cent. Tier 3 standards are currently applicable to ships entering a NOx Emission Control Area but would apply to all ships built from January 2016 regardless of where they trade (IMO 2013).

The main control measure for limiting SOx emissions from ships involves capping the sulphur content in ships' fuel oil. The limits are set depending on whether or not the ship is operating in a restricted area, known as a sulphur emission control area (SECA). At the time of carrying out this study, the world-wide sulphur cap was 4.5 per cent (and 1 per cent when in SECA[52]). This limit has dropped to 3.5 per cent since 1st January 2012. There are additional limits imposed by the EU for all ships in member countries' internal waters,

[52] Prior to July 2010, a lower limit of 1.5 per cent applied to the sulphur content of fuel oils used on board ships when inside an emission control area.

to burn fuel containing no more than 0.1 per cent sulphur. A similar cap applies in the United States to ships entering in California waters, which is home to two of America's busiest container ports. It is important to state here that ships are, however, allowed alternative measures under MARPOL, such as the use of approved exhaust gas cleaning systems or similar abatement technology, to limit atmospheric pollution.

SOx emissions are fairly comparable across different fleet types whereas NOx emissions are relatively higher in the bulk and container sectors. Overall, container ships have been found to be the largest emitter of atmospheric pollutants. The average exhaust gas emission on these ships is 54 grams per kilogram-fuel of SOx and between 62-89 grams per kilogram-fuel of NOx (Dalsoren et al. 2009). A 95,000-gross tonne container ship burning heavy fuel oil of just over 3 per cent sulphur content can emit up to 49 grams of SOx per kilogram of fuel. This emission could be significantly smaller (around 4 grams per kilogram of fuel) when running on fuel oil with a sulphur content below 0.1 per cent (Lack et al. 2011).

6.2.1. Controlling Emissions from Ships: Managers' Perspectives

Compliance with NOx limits was achieved at component level. The Company's ships were fitted with approved engines and generators as part of the ships' International Air Pollution Prevention (IAPP) Certification. According to the Company's procedures, in the course of routine overhauls, related components such as fuel injectors, had to be replaced with parts of the same type in order to retain the IAPP Certification. Compliance with SOx limits was achieved in two ways: (1) procuring supplies of compliant fuel; and (2) changing over to the correct fuel type when in restricted areas. Samples were taken during bunkering and sent to the Company's laboratory to test for sulphur levels (and for chemical contamination). New supplies were held on board until the results of the laboratory analyses had been confirmed:

> *Um we've got the fuel checklists and once bunkering is done the fuel is analysed. And it has to be analysed before it can be used; or the results from the analysis have to be received before they can use the bunkers and given the sort of sulphur content, things like that. (Tung [onshore personnel 5])*

According to managers, it could take up to three weeks before test results were confirmed. This suggests that procedures for managing air pollution from the ship's exhaust would require some amount of planning and prudent fuel management on board.

The Company had procedures for changing over to the correct fuel type. In the view of one onshore participant, managing this effectively involved allocating separate tanks for different fuel types on board:

> *So again people are um managing this; we're splitting fuel tanks in half so we have a low sulphur fuel tank and a high sulphur fuel tank. Um we're putting extra oil tanks - cylinder oil tanks - for the engines so we have cylinder oil when operating on a high sulphur fuel and separate cylinder oil for low sulphur fuel. (Harry [onshore personnel 1])*

There was a time lag involved in getting the ship change over to compliant fuel and so the engine department was required to work out how early the ship should start the changeover process. Although the Company had a procedure in place for calculating fuel changeover, actual completion times varied with ship requirements. According to one manager, the entire process could take up to 24 hours to get the correct fuel type through to the engine:

> *The vessel is out in the Atlantic, well one day steaming from five degrees west where the SECA area starts for Atlantic crossings you know. Twenty four hours out, the chief engineers have to carry out a fuel consumption calculation which tells them exactly when to start changing over. Because there would be engines different, the timings different, the automations different, so it might be only 18 hours you need to change over for this type of engine. So yeah it's all calculated on board the ship. It's well done as long as the crew understand and do it correctly. (Max [onshore personnel 7])*

Managers believed that was important for crew to get the calculation right as this was the only way they could prove that the ship was burning compliant fuel when in restricted areas. It was reported during the interviews that getting the crew to become skilled in the changeover procedures had been initially challenging. It was also suggested by onshore participants that the changeover process was time-consuming. One participant thought that having to change over to the correct fuel type when entering restricted areas required crew to spend too much time planning it. According to him, this could be done away with by having the ship run continuously on low sulphur fuel.

So particularly with the Fair Winds, because she trades from the Mediterranean to North Europe. So when she passes a certain line, when she's coming across the Bay of Biscay; when she starts coming to the English Channel. […]They have to change over to low sulphur fuel you know. For me it's pointless them having two types of fuel on board because the amount of time they spend, they just as well just go one fuel - low sulphur. (Bill [onshore personnel 2])

Three main difficulties have been identified with complying with regulations that require ships to switch over to low sulphur fuel oil when entering restricted areas (see also Sampson 2012). Firstly, a number of existing (and much older) ships only have a single service tank and it is not feasible to retrofit them with extra tanks. This makes the fuel changeover process more time-consuming and problematic. The second difficulty is supply problems triggered by the creation of new emission control areas (North America and the Caribbean) and competing demand from the automobile sector in the United States, both of which are anticipated to further increase the demand for low sulphur fuel oil beyond what refineries can currently supply (see also US Environmental Protection Agency 2010). Concerns about off-spec fuel is the third major difficulty with compliance as there is currently no real-time control mechanism in place to ensure that bunker suppliers are delivering compliant fuel (Bloor et al. 2013[b]; see also Matthews 2011[a]).

On the face of it, running ships continuously on low sulphur fuel when trading regularly between restricted and unrestricted areas might do away with some of these problems, as well as with the time and effort that goes into planning the operation. However, the main challenge for shipping companies has been cost (see, for example, Bloor et al. 2011; see also UK Chamber of Shipping 2013), and this more expensive option might also mean more maintenance work for engine crew. Indeed, shipping companies are increasingly aware of the trade-offs involved with using low sulphur (see, for example, Lloyd's List 2011; Eason 2011) and analysts have highlighted maintenance problems arising from continual use of low sulphur fuel (US Environmental Protection Agency 2010).

Although slow steaming[53] has been traditionally practiced on container ships for commercial reasons (see Matthews 2011[b]; Wienberg and Bhatia 2012), it is now also being considered by the shipping industry for environmental reasons (Hodne 2011; Lloyd's List 2011; AGCS 2012). Global slow steaming strategies are believed to have had both positive

[53] This is a practice of sailing at reduced speeds that became a commercial strategy in response to the global recession in 2008. Slow steaming allows ship operators to save on fuel costs and also to absorb excess capacity by employing more vessels to make up for the longer sailing times.

economic and environmental effects (see, for example, Krishna 2012). However, managers in this study argued that commercial interests usually informed judgments about the need to limit the ship's speed, possibly implying that the goals of saving costs and reducing harmful ship emissions might be mutually exclusive (see also Dunning 2013).

> *Yes, yeah. Yeah…by reducing speed you can burn less fuel, and then if you burn less fuel there is less emissions […] Well it's part of a normal economic policy and that always has been even before these regulations on the sulphur content came into force. […]You know most of the ships that we operate; the money is made on freight. So the more cargo you carry the more money you make. And if you can load or discharge a cargo as soon as possible after loading it then you can load the next cargo. So generally the ships are running at full speed and unless they are told to go at reduced speed and there may be reasons […]But I have to say the majority of these considerations I would say are based on economy rather than... That maybe sounds a little bit... that we're not really considering the environment but... (Jimmy [onshore personnel 3])*

6.2.2. Controlling Emissions from Ships: Seafarers' Perspectives

Of the two ships I visited, the *Fair Winds* was trading in a partly restricted area (in North Europe where SECA and EU limits applied; and outside) and therefore had to change over to low sulphur fuel oil (LSFO) each time it was entering these areas. The *Belle Mers* was continuously running on heavy fuel oil (HFO) unless the charter required a US port call (California). However, during my stay on board, the latter ship was trading in an unrestricted area. On both ships, the main sources of atmospheric emissions were from the main engine, auxiliary engines and boilers (and the incinerator on the *Fair Winds*). Prevention of air pollution from NOxs and SOxs was mainly the responsibility of engine crew. However, the deck department played a support role by monitoring smoke from the ship's funnel (e.g. if it was too thick) and advising the engine department about what time the ship was expected to enter or leave a restricted area (including anchorage and berthing).

On board the *Fair Winds*, the engineers used an LSFO changeover calculator. This tool (spread sheet) helped them to work out the time needed to dilute and flush through HFO to meet the legal limits required for operating in restricted areas (see also Lloyd's Register 2011). However, and according to the Company's fuel changeover procedures and related guidance from Class, this was only a rough calculation. Ship staff also had to ensure that there was an adequate stock of readily available fuel oil to keep the engines and boilers running, and that the generator plant remained available throughout the

changeover process. Although one engine officer confirmed that the procedure was being followed on board, he said he could not tell how long the process lasted because he was not directly involved.

> *Yes we change. High sulphur or low sulphur we have plan for change over. But this is controlled by chief engineer and 4th engineer. Chief engineer checks the plan and give orders to 4th engineer. That's always SECA zone or is Europe area and Asia area. […] It is not my direct responsibility but I know how this [works]; I know total but not some parts what to do directly and what needs to be done directly. […] I don't know how much time [it takes] because this...I don't ask chief engineer and 4th engineer because they don't ask me about main engine - about my job. It's his business. I don't ask. (Ben [engine officer 1])*

Nevertheless, according to one cadet who seemed more familiar with the procedure, the entire fuel changeover operation required advanced preparation and could take up to one day and a half:

> *Researcher: So how does this happen when you change from high sulphur to low sulphur; are there some things which they have to plan and prepare in the engine room for that to happen?*
>
> *Serge [Cadet 2]: Yes, yes they calculate it because there are turning points in this border line where we must already be using low sulphur. So that one is computed by chief engineer and 4th engineer. 4th and chief engineer are the ones working with that and then [during] changing time, 4th engineer is the one that changes the high sulphur and low sulphur.*
>
> *Researcher: So when you watch them do it does it take a long time - the preparations and everything?*
>
> *Serge: Yes it takes. Because transferring, draining the fuel tanks and changing it; draining the high [sulphur] fuel tanks and changing it to low sulphur tanks takes time, takes time.*
>
> *Researcher: About how long - days?*
>
> *Serge: Yeah a day or a day and a half preparation maybe. It's like that.*

The above excerpt suggests that the process of fuel changing is time-consuming. Such increasing demands on seafarers' time on board as a result of complying with ship emission control requirements can add to the experience of fatigue at sea.

The procedures for controlling ship emissions also required engine crew to verify the compatibility between the two fuel types before beginning the changeover process.

Managers' concern about the time and effort requirements reverberated in suggestions during the shipboard interviews that seafarers might have to go through a lot of trouble to be able to achieve the sulphur limit at the engine inlet. According to one engine officer, a lot of planning went into it:

> *It's planning. Also you cannot mix this fuel; suppose the density is 0.988 and another one is 0.999 so you must consume first: make to the lowest from the tank before you use the other one. Otherwise you will... too much problems for the purifier. You will become crazy about the density [laughs]. (Fiifi [engine officer 4])*

As this quote suggests, the issue of achieving the correct sulphur content fuel during changeover procedures is complex. Failure to follow the correct procedure can result in breakdown or damage to the engine, which can seriously impair the safety of both the ship and persons on board. Fuel switching on ships is known to have serious compatibility and feed temperature issues (US Environmental Protection Agency 2010). Problems have been highlighted about the practicality of doing this (Bloor et al. 2011) and concerns raised about the risk of fuel changeovers not being correctly performed (International Chamber of Shipping 2010; AGCS 2012).

Fuel switching can sometimes be done at short notice or even during night arrivals or departures. For night operations, the process would require engine crew to work outside their regular hours[54]. In the view of one engineer, the engine department was inadequately staffed for its work demands and they could not possibly avoid overtime if they had a night departure or arrival as the engine room would still need to be manned the following day.

> *[…] It was hot in the engine room and very noisy too. Back in the control room, it was less noisy so we could talk. I enquired how long it took to take bunkers through the purifier and he [engine officer 3] said about 7 hours. […] He said a lot of work was involved and usually they did overtime. He said the company often complained about overtime work arguing that it was a result of poor time management. Engine officer 3 said it was practically impossible for a team of four to man the engine room and "company" was neither prepared to approve overtime work or increase engine room staff. He wondered how they could possibly avoid overtime if they had a night departure and the engine room needed to be manned to following day. He said all the company was looking at was trying to "save money". (Diary, 29th October 2011[Day 7])*

The above excerpt serves to illustrate that engine crew may not have been properly rested before commencing their duties on the ship. As a consequence, they would have been

[54] The engine room on both ships was normally not manned at night with the exception of a duty officer who monitored it remotely.

fatigued from poor quality sleep or interrupted hours of rest, and from occasionally working more than the recommended hours of work. It is also indicative of the stresses that may be induced by the Company making demands to the seafarers while failing to provide adequate resources on board.

Most of the routine maintenance done in the engine room was related to complying with NOx limits. Although the ship's engine was approved for operating within the allowable limits for NOx emissions, ship staff still had to ensure that essential components which go with the ship's International Air Pollution Prevention (IAPP) Certification were in good working order at all times, and that the ship's fuel pumps and injection system was properly maintained:

> *Yes, it's normal yeah; filters, injections, oil, purifiers. […] Ah every day; normally [cleaning of purifier discs and changing of filters] every day or every two days. It depends if it is working; we have the alarm so you can [see] on the computer [control panel] if it's dirty you know. But normally every one day; one day they clean. (Yoofi [engine rating 4])*

In addition to carrying out routine maintenance on the engine and its related components, the crew also had to treat fuel supplies to prevent any damage to the ship's engine that might affect the IAPP Certification. Seafarers thus confirmed that fuel samples were taken during bunkering and tested for grade-related specification[55] before the fuel could be used on board. According to one engine officer, impurities had to be removed by taking the fuel through a purification process in the engine room.

> *[…] This one also, in our bunker; you know bunker is the lowest grade so plenty properties [impurities] from this; especially this vanadium can destroy the engine. Vanadium, silicon […] That's why we have this sample before bunkering. We need their [supplier] samples and after we finish bunkering we give also the samples. And we bring to the laboratory to make sure that the oil is good. Otherwise how many content: water content; Vanadium; silicon; plenty properties. If it passes the laboratory [test] then we can use. And then also, this injection temperature is very important for how much density is the fuel. (Fiifi [engine officer 4])*

[55] In addition to statutory testing for sulphur content (see also Bloor et al. 2011), fuels supplied to ships are voluntary tested by ship operators for the correct specification (e.g. density) and for impurities (e.g. Aluminium, Silicon and Vanadium) which could cause damage to the ship's fuel pumps, injectors, piston rings and cylinder liners.

These activities undertaken by ship staff to ensure that the ship's engine was compliant with NOx limits are carried out as part of a routine and therefore seafarers are unlikely to perceive the associated tasks as extra demands on their time on board the ship.

Like managers, seafarers also perceived the practice of slow steaming to be more about profitability for operators rather than about environmental considerations. The suggestion has been made in industry circles that slow steaming could be used as a strategy to improve information sharing between ship and shore within an environmental performance system (see Matthews 2011[b]). However, it appears from the accounts of seafarers in this study that implementing such a strategy might not necessarily achieve this. One seafarer argued that reducing speed was hindering adequate combustion and that occasionally ship staff made their own judgments about what vessel speed was required to minimize pollution.

> *I think it's generally only commercial thinking priority. Every time if they say "reduce speed" we reduce speed. It's not so good for main engine. You know, if there's no good burning inside it means accumulated carbon inside. It's not good. I ask every time and captain of course communicates with me and we try full [load]. Also diesel generator we try to make it full load. Full load is less of pollution. (Kwabena [engine officer 3])*

6.2.3. Assessment

The analysis in this section has shown a general agreement between the views of both managers and seafarers at the case study company about what constitutes compliance with requirements for controlling ship emissions. Both groups of participants acknowledged the work demands that came with complying with emissions regulations when trading in restricted areas. Managers and seafarers also believed that although regulating the ship's speed had a potential for reducing pollution, this was rather more often implemented for commercial reasons.

The analysis suggests that ship staff required a high level of training to be able to comply with fuel changeover procedures on board the ship. The findings also suggest that the practice of fuel changeover was time-consuming and that, taken together with other job demands and work patterns in the engine room, seafarers working in the engine department had been overburdened and therefore fatigued. Interestingly, "zero impact on people" was identified for this particular activity in the Company's risk assessment (see section 4.5.4).

The evidence provided is constrained by the limited number of participants in the engine department on both case study ships. Fuel changeover was a specialist task on board and usually only about two officers were directly involved in the operation. The data and evidence could only have been improved by visiting several more ships to include more of such crew in the sampling frame. Nevertheless, the findings suggest that seafarers are susceptible to fatigue and accompanying stress levels on board as a result of increased work demands in the engine department arising from of ship emission control.

6.3. Concluding Observations

The analysis in this chapter has shown that ship staff in the engine department had experienced high job demands from the process of pollution prevention during bunkering and when planning and carrying out fuel changeover operations. The findings also demonstrate that engine crew are susceptible to working beyond the recommended hours when complying with the relevant requirements. While this occurrence may have been occasional rather than consistent, the combined effect of longer working hours and sleep deprivation (e.g. during fuel switching for night departures or arrivals) can potentially contribute to fatigue among crew.

The results suggest that seafarers' can experience the task of oil and atmospheric pollution prevention as onerous and stressful because of inadequate staffing, combined with responsibility for any vessel pollution that may occur while the ship is at sea on in port. The issue of fatigue and stress in relation to the provision or the lack of adequate resources by the Company to support environmental programmes on board the ships requires further discussion.

Inadequate manning levels on ships has been associated with fatigue among ship staff and is also thought to be the underlying cause of most incidents and accidents aboard the ship (MAIB 2004; Smith et al. 2006). Thus, reduced safety due to crew fatigue may increase the risk of incidents and accidents on ships that can result in casualties and pollution. In land based sectors, fatigue from working longer hours or from sleep deprivation has also been associated with impaired performance and negative safety outcomes (Folkard et al. 2005).

CHAPTER SEVEN: MANAGEMENT CONTROL IN THE IMPLEMENTATION OF ENVIRONMENTAL REQUIREMENTS

7.0. Introduction

The preceding two chapters of the analysis have covered in detail the various requirements for managing container ship-source pollution and how seafarers operationalized these on board the ship. The ensuing analysis in this chapter considers more broadly the nature and impact of the controls that cut across the process of complying with the environmental requirements outlined in chapters five and six. The analysis demonstrates considerable variations in the understandings of seafarers and managers about procedural requirements which were derived from *Taf Shipmanagement's* implementation of an environmental management system (EMS). In doing so, the analysis will highlight the broader contextual factors that shaped the attitudes of managers and seafarers within the Company. Specifically, I will identify a number of procedural controls used by the Company to get seafarers to work in a coordinated fashion so as to improve its competitive edge on the market.

I will argue in the analysis that these control mechanisms were versatile, especially because they lent themselves to individual performance of seafarers at the same time as they sought to increase production on board. These extensive procedural requirements were developed through paper compliance and other control measures within the EMS. Studies have shown that depending on how such quality management systems are implemented across an organization, the outcomes may well be differentiated (see, for example, Yin and Schmeidler 2009; Curkovic and Sroufe 2011). I will demonstrate in the analysis in this chapter that the implementation of an EMS in this case study has led to increased work demands for ship staff and a general feeling of anxiety on board which, in turn, resulted in poorer working conditions. The analysis in this chapter is followed by a discussion of parallels between the kind of monitoring and control that takes place in land-based work and those that are occurring in the workplace environment at sea.

Shipping companies, like many global commercial organizations today, have turned to management tools and principles that involve more controls, emphasize adherence to rigid procedures and attention to detail. This is in an effort to ensure that shipboard practices do not produce non-conformities (or deficiencies) and ship detentions when

regulatory inspections (and commercial audits) take place. While the implementation of management control systems in the shipping industry may be justified because of the remoteness of ships as an organizational unit, top-down procedural control practices which managers apply to ships tend to reduce seafarers autonomy and discretion which research has linked to stress and related health problems (Karasek 1979; Bosma et al. 1997; Kuper and Marmot 2003).

The prescriptive nature of management control practices can be identified in the case study company's process of complying with environmental requirements. As this chapter will demonstrate, the adoption by the Company of such procedures was interpreted by both managers and seafarers as increasing work demands or paperwork as they described it (see also Knudsen 2009). It was also perceived by seafarers as generating a feeling of anxiety from over-supervision and the accompanying stress. Two perspectives are offered here. First, the discussion draws on company interviews and documents to analyse managers' perspectives on the issue. Management control is then further examined from the accounts of seafarers through a combination of shipboard interviews and ethnographic observations.

7.1. Managers' Perspectives

Monitoring and control of shipboard environmental work activities at the Company took two main forms. First, a number of checks were done remotely through reporting requirements from ship staff to the Company. Senior officers had to complete periodic reports updating the Company on various issues in respect of the different environmental programmes including, among other things, the ship's environmental footprint; occurrence of environmental incidents; and the effectiveness of the environmental management system (EMS). These reports were either paper based or their electronic equivalent.

Managers recognized that paperwork on board ships was an issue but they believed that it was necessary in order to be able to comply with environmental regulations and similar commercial requirements. According to most shore-based participants, there was increasing paperwork for ship staff to fill out, more records for them to keep on board, and the archiving of paper documents in cases where the regulations required ships to keep old records for a certain amount of time (e.g. oil record book). Some paper came in the form of manuals with the installation of new shipboard equipment. Others had to do

with requirements to implement new environmental regulations. For example, during the office interviews I learnt that ship staff were required to print out the ballast water exchange plans for their vessel, which came in folders of about 100-250 pages each.

In the view of one onshore participant, the increasing paperwork was as a result of implementing a safety management system or SMS (which incorporates the EMS) on board and that the situation was the same across the shipping industry:

> *Well... Yes I mean a safety management system increases the paper work more than what it used to. So this is one of the normal complaints - continuously filling out forms and… But that is industry driven and no matter where you go it will be the same in any shipping company. (Harry [onshore personnel 1])*

Managers reported that complaints were often received from shipboard staff about having too many forms to fill in and that they were overburdened. Some of these complaints had to do with the frequency of reports (weekly, monthly and quarterly). However, managers argued that such paperwork was needed to comply with the regulations and that the Company had to maintain such records for the purposes of external audits (see also discussion in section 8.2). Managers further argued that the Company was taking steps to reduce the amount of paperwork on board its ships. This involved computerizing the forms so that these could be completed electronically. In the view of one onshore participant, the Company had cut back on the number of forms that the crew were required to complete by having them do it using computers:

> *All those [complaints about paperwork]; we get that back from captains yeah. I mean I believe the number of forms that they have to fill in have come down anyway because a lot of it is done on a computer now you know. (Max [onshore personnel 7])*

An example of this reduction in paperwork through computerized systems is the ship's monthly environmental report (EMS-01). The EMS-01 identified and measured the various types of waste generated from the Company's fleet operations, and where this waste went. These forms were completed on board by the Captain and Chief Engineer, and returned electronically to the Company. The forms originally covered six pages and had now been condensed into an electronic spread sheet template. However, in the view of one manager, computerizing the forms had not reduced the amount of effort that went into completing them:

Tung: [onshore personnel 5] For the environmental records, within our SMS we only have I think it's two forms. They encompass quite a lot but comparatively...They've got two forms; EMS-01 is the main one but that records everything so instead of having six different forms you've only got one form and I think that makes it seem like it's not as much to do as it...everything else.

Researcher: Is that one form on one sheet or with six sheets on one?

Tung: Six sheets on one form [laughs] yes. That's the way this one works. Um which I think is deceptive because you think you're not doing much because it's only one form. I think paper work is a big problem for the office and for the vessels.

There were also indications that completing "paperwork" activities was time-consuming for crew because a greater number of "sub-accounting" tasks need to be carried out in advance. For example, I observed that the monthly environmental report (EMS-01) from the ship was computed from between 14-23 separate records (e.g. entries from the garbage and oil record books) depending on the ship type. One shore-based staff member commented that the process of getting all the required information could involve a lot more work for crew and that it might take even longer to achieve:

Yeah [a] few pages [laughs]. We have a page for each month then we collect the data on separate pages. But there is a few...To be honest, it doesn't look a huge amount of work for them but I don't know what they have to do to get those figures. It could be days' worth of work but it falls under one spread sheet. So far as it looks good but it could be a long task for them. (Warren [onshore personnel 6])

Indications from managers that the Company was finding it difficult getting crew to send in environmental reports on time suggests that ship staff may have been reluctant to follow the procedure (see also Knudsen 2009). According to managers, the common excuse which ship staff gave for being unable to send in the forms was that they were overburdened and could not find time to do it. One onshore participant explained:

In the past I know a lot of the vessels, we used to receive them - well sometimes we didn't receive them - we used to receive them very late. And it was just the captains; if we pressurize them to send them in they would say: "Well I don't have time at the moment." As I say, it is getting a lot better now. Um they generally submit it on time. But in the past, the near past as well, in my opinion they've been a bit resistant to do it. And they always say they are very busy, they are too busy to do anything else. (Warren [onshore personnel 6])

Seafarers' reluctance to follow the procedure is further exemplified in one manager's remark that even when the forms were eventually returned, they had not been properly completed. According to him, there was a tendency for some Captains to replicate information from previously completed reports, such as the Master's review of the EMS form:

> *And you'd normally find that some Masters are pretty good at filling them with comments while others will just cut and paste from the previous month so you get a repetition of exactly the same one as the one you got last month. So what I will do when I review these, I just say: "Captain, this tells me nothing about the environmental compliance on board your ship. Please start again and send me better information." (Max [onshore personnel 7])*

The second form which extensive procedural controls took at *Taf Shipmanagement* involved regular shipboard visits which were undertaken at least twice a year for each ship. For example, each vessel was assigned a superintendent who was responsible for monitoring compliance on board their designated vessels:

> *What we're starting to do now, when the superintendents carry out the inspection of the ships, we give them a little brief to take: "Make sure you discuss this with them; environmental compliance, inspection on the deck and engine rooms, if there is anything you see pick it up." […] (Max [onshore personnel 7])*

Superintendents were also responsible for conducting internal environmental audits of their ships, and for ensuring that corrective actions concerning those ships from reviews of the EMS were effected. The Company further controlled environmental protection-related work on board its ships by having every newly recruited senior officer come through the office. Arguably, this would consist of a normal induction process. However, in the view of some onshore participants it was a means through which the Company stayed on top of what its Chief Engineers and Masters would eventually be doing on the ship regarding the Company's environmental programmes.

Besides physical contact with shipboard personnel, the Company had other means of controlling environmental protection-related tasks on board its vessels remotely. For example, stocks of spares for critical environmental equipment and adherence to the schedule for their maintenance could be monitored within an electronic planned maintenance system:

Yes there is... all critical equipment, whether it is environmental or operational or safety is... they are all featured in our planned maintenance system - electronic planned maintenance system -which the technical superintendents here can access from within the office. So they can look to see if the maintenance is being carried out, the testing procedures are being carried out for the various pieces of critical equipment, well for all the equipment on board all routine maintenance. (Jimmy [onshore personnel 3])

Similarly, there were physical control measures on board the Company's ships which required permission from the office. For example, an operation for discharging bilge water from the ship's machinery spaces required unsealing of the overboard valve with prior approval from shore-based management. As this participant describes it, all flanges or pipe connections for transferring oil residues within the ship's machinery spaces were secured and serially tagged to keep track of operations involving the disposal of oil residues and oily wastes. Permission had to be sought from the shore-based managers before these seals could be broken or replaced:

[…] and the way we control it is we have a tight policy. So all of these flanges, we drill the bolts and we put a plastic tag with a number on it. And it's recorded in the system and then, when the guys go on board to visit or on audit, they can check all of the tags and if there is one broken then they [crew] have to prove they've had office permission to... And you need to, I mean you actually… you need to break these and open these pipes up and things like that for cleaning or for maintenance if you find that one's got a hole in it and you need to renew the pipe. But you have to have your authorization from this office. And it's controlled that way. (Harry [onshore personnel 1])

In addition to the annual internal audits conducted by the ship superintendents, the Company also had external shipboard audits from third parties such as customers (e.g. organizations hiring the ship or moving large volumes) and flag states[56]. Such audits covered a number of accountability requirements on the environmental side of shipboard operations. Shipboard audits were further conducted externally as part of the Company's ISO certification[57] of its environmental management system. In the view of one manager, a lot of the audits would not have been necessary if the Company were only operating container ships:

[56] See explanatory note in chapter one.
[57] International Organization for Standardization. See also explanatory note for ISO 14001 in chapter four.

[...] within our office, we're audited within the ships, we're audited intensely because of the type of vessels we got here. It's… if it we were just purely container or bulk it wouldn't be as an intensive. You don't have to have SIRE [Ship Inspection Report], we don't need to have... and the levels of operating tankers are WAY WAY higher than the other types. So you'll get a different set of answers from a bulk carrying company or something like this. […]What I'd say is we're driven at very high standards and which is a good thing. And we're driven by the oil majors mostly. I'll show you a TMSA [Tanker Management Self-Assessment] now. I'll get the guys to show you a SIRE. We take these same principles and we operate them on our container ships as well. […] (Harry [onshore personnel 1])

However, as the above quotation equally suggests, the Company was primarily tanker driven (see also section 4.2) but was applying the same standards across its entire fleet. It may be that the Company's container ships were operating at a much higher standard (when compared to the container sector of the shipping industry) because of the need to comply consistently with the performance requirements of the tanker market. The assumption in applying similar standards across the fleet would be that crew mobility could be improved between different shipping sectors without affecting performance standards.

7.2. Seafarers' Perspectives

There is generally no sustainability reporting requirement under international law in shipping [58]. Nevertheless, companies are required to maintain a number of environmental records on board their ships. Some of these are for statutory purposes whereas others are in kept in accordance with company policy. At *Taf Shipmanagement*, additional records were kept as part of internal monitoring and control measures under the environmental management system (EMS). This served as a means through which managers could vigilantly enforce the Company's environmental compliance programmes on board. The records also served to identify and correct non-conformant practices aboard the ship and to ensure that the vessel's records were accurate and verifiable.

EMS procedure manuals on board the case study ships were held in electronic and hard copies and these were available for crew reference. Ship staff felt that they could actually influence these written procedures:

[58] Note, however, that some shipping companies report on environmental sustainability in compliance with trading requirements (e.g. listed companies) or simply to protect their image (e.g. oil majors and mining concerns).

> *And our company also, every year the company improves its manuals to make easy to read these manuals so they are always asking the same questions: if we have any remarks, if we have any other solutions [suggestions]. […] I have been with this company long time. I know how we are working with this. I can tell you; yeah they are always hearing us and every time we correct these manuals. Ken [deck officer 4]*

The above quotation suggests that ship staff were given adequate attention to issues they raised in relation to the operation of the EMS on board the ship. The presence of such a framework within organizations for employees to identify practical problems and also to make suggestions about how procedures could be improved has been recognized as being central to the effectiveness of safety management programmes in the workplace (Hopkins 2005[a]; Vecchio-Sadus 2007).

Apart from the EMS reporting requirements, such as the monthly environmental reports and the Master's semi-annual environmental review, a number of other physical forms had to be completed and maintained on board the ship to comply with legal environmental requirements. These include the garbage record book, oil record book and ballast water record book. The garbage and ballast water record books were preserved on board for a period of two years after the last entry had been made, whereas the oil record book was held for a period of three years. Copies of these records were completed and signed by the ship's officers in charge, and for every operation, the Captain was responsible for signing each completed page.

For the oil record book, some entries were made weekly and others immediately following the operation. For example, entries for the non-automatic discharge of bilge water from the machinery spaces had to be done in real time and would indicate: (1) the date of the discharge; (2) a code reference for the operation (in this case code D); (3) the start and finish time of the discharge; (4) the method of discharge (in this case via 15 ppm equipment) and geographical position at start and finish times; (5) the quantity discharged in cubic metres; and (6) the rank, name and signature of the officer in charge of the operation. In addition, a separate code entry would be required for the operation of unsealing and re-sealing of the overboard valve (UK P&I Club 2011). Records for ballast water were maintained in a similar manner and entries were made for uptake, treatment or circulation and discharge volumes.

Seafarers confirmed managers' perceptions that completing paperwork had intensified work on board. They went further to suggest that following written procedures

might compromise safety on board the ship (see also section 8.2). In the following diary excerpt, the attitude of one senior deck officer suggests that there was a real potential for paperwork to interfere with other activities on the ship, such as the safety of navigation:

> *After my interview with deck officer 1, he was on the bridge and a call came in. As he answered, I guessed he was saying [in foreign language] that he had just been through an interview with me. I figured that the phone call was about some report he was due to complete for the office and as he hung up, he said in his usual chatty manner: "Another question we have to ask is 'Can the company survive without weekly reports?'" He complained about the frequency of reports: "…from weekly to monthly" he said, and as he filled out the report he went on: "You see, I am supposing to be watching [bridge watch] but I am not looking there [points to horizon and bridge console]; I am looking here [points to desktop monitor]. And then what happens? Collision!" (Diary, 9th June 2011 [Day 5])*

Although a similar reluctance about paperwork was also shared by senior ship staff in the engine department, the view here was mostly about the resulting additional work demands on board rather than about conflicting requirements with safety. As one engine officer described it, it was difficult to juggle additional work demands from the completion of paperwork with other duties in the engine room:

> *Ah yeah it's some paper work because if you look, [mentions rank] became administrator [points to lever arch binders stacked on shelves in cabin] not engineer. Working every time computer: from the morning, mailbox: I have to read, prepare some answers. Of course it's becomes (sic) difficult. Nobody frees me from the responsibility inside the engine [room] you know [laughs]. […]Of course it's now become more work; more duty, more responsibility for [mentions rank]. […] (Kwabena [engine officer 3])*

One commentator has suggested that conflicting demands can arise from such job designs which require workers to be "functionally flexible" (Green 2006) thereby rendering the work experience onerous and stressful. In the shipping industry itself, it has also been suggested that conflicting work demands on board might compromise the safe operation of ships (see, for example, Knudsen 2009; Grey 2010).

I could confirm from being physically present on the ships that there were control measures and devices in place to prevent deliberate non-compliance on board and falsification of monitoring records. During a tour of the engine room on both ships, I found that tags had been fitted on most flanges I came across, particularly the overboard valve which was secured with a chain. Warning notices were also used on board as a control

measure. On the *Fair Winds*, a notice posted next to the oily water separator read: “Warning! Oily bilge separator can be started only of (sic) Chief Engineer. Overboard valves keep close with lock and seal. Key should be at (sic) Chief Engineer.” Although most of these built-in control measures – at least from a quality management perspective – would be intended to dissuade rather than to catch people (Sewell and Wilkinson 1992), the accounts of seafarers in this study seem to suggest the contrary. During an unrecorded interview with one engine officer, he had said that some companies were too strict on their requirements and that *Taf Shipmanagement* was "optimal". He said he had worked for some companies which had a procedure for every single move you made and where e-mails and photographs had to be sent out requesting permission for dealing with even the most trivial matters. The above example serves to illustrate that seafarers did not interpret company requirements to maintain documentary evidence of ongoing environmental programmes on the ship as an environmental control measure but rather, as a form of over supervision.

Taking the above perception about company control measures further, when it came to contact with onshore colleagues and third parties for the purpose of verifying environmental compliance on the ship, the general feeling among ship staff was one of anxiety. For example, in the Master’s review of the EMS for one of the Company’s ships, one Captain had commented that feedback from audits was helpful but the presence of auditors on board aroused anxiety and fear among crew from being scrutinized in the conduct of their job:

> *Corrective action taken on audit findings are found to be effective; the shipboard safety meeting discussed observations on audits; the crew considers auditors as owner and or company’s representative, although, some feel indifference (sic) when an auditor is on board for fear of being watched attentively for any wrong acts […]*

Similarly, there were indications that seafarers were also experiencing anxiety and pressures from enforcement agencies, particularly those of the United States. Regulatory enforcement in the United States is known to be exceptionally punitive (Bardach and Kagan 1982). As one deck rating described it, very severe sanctions could be imposed for even the smallest violations:

> *Yeah we experienced that in America. We cleaned already; we cleaned all the ship but they found some - only one seed [fruit]. One seed! Very strict country. Only one seed! We [got] fined one thousand dollars. You believe that! (Kodjo [deck rating 9])*

There was a feeling among crew that such penalties were unfair, especially because they targeted violations which were more often unintentional. According to one cadet, the penalties for discharging oil in American waters were unreasonable and excessive. He argued that no seafarer would intentionally infringe the requirements for managing oily wastes from a ship, and that such heavy sanctions could destroy seafarers' career in cases of accidental discharges:

> *I think [pause] for like discharging oil and stuff into the water in certain places I know, especially America, the penalty for it is like you can go to jail for it and stuff. I think nobody is on purpose going to let oil go into the water when they are in charge of a ship. But then I think the Americans are just stupid and decide to send people to jail for it. I think that is way over the top for something that obviously a chief engineer or a captain is never going to do it on purpose, so it's obviously an accident. If they didn't mean for it to happen then they can jeopardize their whole career because the Americans can send them to jail or give them a stupid fine. (Koku [cadet 7])*

The preceding two quotations also serve to illustrate that seafarers questioned the severity of sanctions attached to infringements of environmental requirements in strict countries and made judgments about what was an acceptable form of punishment for non-compliance because they were not happy about the penalties in place.

As seafarers were conscious of the American punitive image, the prospect of a US port call tended to induce above normal work levels on board ship. The crew had to cope with the anxiety and stress that came with preparing a US arrival. The ship was normally issued advanced warning by the Company to expedite US arrivals. Whilst such reminders might mitigate the risks of non-compliance for the Company, it tended to produce a different effect for the crew. Seafarers said they were concerned about calling at US ports because America was a very strict country. According to one cadet, they were worried about having to meet all the requirements and avoiding any fines or getting the ship detained:

> *It's not easy for us because it is a restricted area like in America, they are very strict about this kind of matter. So we are worried about these things. We must apply what they need. So we can avoid all the fines or anything; detaining the ship, because detaining the ship costs a lot of money as I know. (Ato [cadet 5])*

However, it appears from the view of another participant that it was not only the plethora of requirements by US ports that was causing anxiety on board the ship but also the rehearsals which had to be performed as part of preparing a US arrival:

> *That's why all the captains - not only this one; I would say all the captains - they don't want as much as possible to go to the US because so many requirements; so strict. Everything they have to check. Especially if it's your first time you go there. But the second time there, a little but ok. But the first time you go, ooh! Um I remember in one of my ships, before the ship will call US port every day we have a drill. Everyday captain make (sic) drill, drill, drill. Sometimes one in the morning, one in the afternoon. Oh this [laughs]! It's so much worry really. (Akwasi [deck officer 6])*

Besides America, there are a host of other countries enforcing strict requirements with regard to environmental regulation. As pointed out in the literature review (see section 1.2), port state control inspection in most European Union countries is known to be conducted with similar rigour and comparably strict environmental requirements have been imposed under the Paris MoU. Thus, anxiety could also be an issue for seafarers on board ships calling at ports in other countries which enforce environmental requirements very stringently.

Seafarers often had to live recurrent moments of fear and anxiety because of the combined effect of these forms of workplace control from both internal and external agencies. On the one hand, ship staff had to deal with pressures from regulatory inspections. On the other hand, they were faced with scrutiny from in-house (shore-based) personnel and third-party commercial interests who monitored their adherence to prescribed environmental practice. One engine officer described the pressure from stakeholders:

> *From all sides everybody pushes us: port [state] control: port authority every time coming. Every time inspect and inspect; coming to look, check. It's not so easy for us to work in this condition. (Kwabena [engine officer 3])*

Another dimension of the feeling of fear and distress among crew on board could be linked to what seafarers thought could happen to them if they were caught doing something wrong. In the following quotation, one deck officer's view on the issue further suggests that whenever seafarers followed company environmental requirements and programmes, they

did so to safeguard themselves from the regulatory consequences of not doing so rather than to protect the environment.

> *[…]Because the first thing, I tell you very frankly, sometimes even if we discharge some prohibited garbage into the sea, it may be small amounts but it cannot cause big damage. But first thing I am afraid of is the authorities or some disciplinary regulations. Yes this is my first worry I tell you very frankly. This is our first worry. Second, we worry about some damage to the marine environment but our first worry is we want to avoid any fine, any disciplinary actions against [us from] the shore or coastguard or something like that. That's why anytime I give some advice to the crew I always take care to be aware of...must be clear of any disciplinary regulations. This is the way I manage. (Mark [deck officer 2])*

The fear of criminal sanctions arising from infringing environmental requirements is not new to the shipping industry (see also Abou-Elkawam 2011). Seafarers in this study reported going to jail as one of the things that they were worried about in the event that they had failed to follow environmental requirements. One of them described going to jail as an end to his career at sea and livelihood:

> *My fear is I broke the rule, I destroy the environment. […]You make wrong to yourself. […]Yes they [seafarers who break the rules] get jailed. I am afraid to go to the jail yeah. […] Because you see when port authority catch (sic) you throwing garbage, your future is end (sic). Future of your family is end; already finish. You have no job, you have no family. You will stay in the jail; your life is nothing. (Eric [engine rating 1])*

However, besides fear about the regulatory consequences, participants had additional reasons to be worried. A resentment of penalties was strongly expressed during the shipboard interviews. Seafarers were concerned about having to pay penalties for infringing environmental requirements. A number of them were unhappy about paying fines out of pocket or having these deducted from their pay. For example, some port state control observations (e.g. incorrect entries in the oil record book) can attract personal fines for the officer in charge (in this case Chief Engineer). In the following excerpts, one engineer expressed great displeasure and annoyance about having to pay fines:

> *[…] I don't like to pay penalty if I throw one oily rag and some guys look and make a photo and send to office. And after company send orders say, for example, "2nd engineer pay penalty." For what? I come for receive salary and not don't use (sic) for penalty. […] (Ben [engine officer 1])*

Although it was suggested during the interviews that only officers could be personally fined in the event of a port state control observation, ratings were led to believe that they would be personally fined as well.

> *They have penalties - they say that. […]Where there is wrong segregation [of garbage] like that. They just say that they have penalty.[…]Yes I am worried because it's [penalty] not only for the company but they said for the person responsible for this area.[…]Yeah, that's what I heard from them. (Kofi [deck rating 11])*

It appears from the above quotations that there was some confusion among ship staff regarding the payment of fines out of pocket. Whereas it was not the Company's policy to pass on fines to crew, onboard personnel simply assumed this was the case and were thus deterred.

The feeling of anxiety was further evident in crews' awareness of the financial implications for the Company in the event of any fines, detentions, or loss of business opportunity arising from non-conformances that were spotted during external audits and regulatory inspections. In the following extended excerpt, one deck rating described how he had "saved" the Company from a potential penalty following a pollution incident during bunkering. According to him, because he had acted swiftly the crew were able to clean up the spill and avoid any regulatory consequences for the Company.

> *[…]We finished operation with lube oil transfer. As I know, there is blowing of air so that the oil from the hose will proceed into the ship. It was finished but I think there was still five litres of oil. […]I made a round check where loading was in number five; there is a connection there. I saw a spill. So immediately I shout "stop!" And then I called by myself using this telephone - public address; "All crew we have oil spill!" So immediately, action because every time we have drill like this, what to do. I also told this truck [fuel supplier] to stop blowing. We collect all this saw dust and put in garbage bag; the oil put in the gallon and then transfer in the engine area. As we start cleaning, because it's slippery, we clean by liquid soap. After this cleaning we use water. Because the crew panicked, the stevedores went to the shore authorities after we cleaned. They [authorities] came and made investigation but they didn't find any oil. They found only bubbles of soap in the water. […]Because I go round check; if not it could have been serious. So I am proud also that. But after that the company will say: "Ok Mr [mentions own name] you are..." [laughs] When we had a safety meeting after this accident [incident] so the captain said "Ok guys, because of Zach we saw this easily and we had to immediately..." Because if nobody saw this happen, big money for company huh. Fines, penalty [laughs]. […]I saved the company but this is also my job; to make sure it's running good and to check and maintain safety. (Zach [deck rating 5])*

The significance of crew awareness of the financial consequences for their employer is apparent in the way in which occurrence of pollution incidents that resulted in unfavourable regulatory outcomes for the ship could cause distress to the ship's crew. In the following excerpt, one deck officer describes how an environmental incident for which their ship was not at fault had affected the ship's crew.

> *My last ship, when our ship was in Mexico, one container, in this container, that is hydraulic oil, it is sealed in bags. And this bag is put into the container and this container is loaded on the top forward [fore]. But accidentally when it just touched the bottom, that is we have some twist locks to lock the container and because that was not properly positioned and due to this twist lock, the container had a hole and there is a leakage. […] So this ship is in big problem. But actually this is not our fault; this is the fault of the crane operators from shore side. This is not our fault but unfortunately this oil pollution is caused on our ship. […]However, our ship got entered for pollution. So in this matter, it is beyond our control; beyond our management because this crane operator recklessly and carelessly put down this container. From our ship's side we can do nothing. This is the way we suffered. (Mark [deck officer 2])*

The experience of anxiety by ship staff in the manner just described also serves to illustrate a perception among seafarers within the Company of oneness or belongingness to the organization, which, in turn, may have influenced how successfully the Company environmental management system (EMS) was being implemented (see also Pratt 1998). It further suggests that seafarers' perceptions of their organization as compliant was positively related to the strength of their organizational identification (Jones and Volpe 2011).

The above quotation is also contradictory in regard to seafarers' feelings about the impact of environmental compliance on the work experience as described in this chapter. Ship staff generally appreciated the necessity to comply with company procedures in relation to environmental protection but they reported feeling worried, stressed and pressured as a result. While some seafarers perceived company procedures in relation to environmental protection as over the top, others did not but blamed their anxiety on the actions of third parties. These contradictions with regard to seafarers' perception of environmental protection requirements in relation to their work experience and wellbeing will be further developed in the discussion in chapter eight.

7.3. Concluding Observations

This chapter has demonstrated that managers and seafarers had considerably different understandings of the Company EMS. Managers believed that completing paperwork was an important activity required for the Company to be able to prove that they were complying with legal requirements for protecting the environment. According to them, the autocratic system inherent in the EMS also served as a management tool for meeting the Company's commercial and statutory obligations. However, the same procedural control measures which were being used by the Company to track and report progress on effluent reduction, and to benchmark these, were also being used to monitor individual performance on board the case study ships. In part, the findings suggest that managers were able to tell how well seafarers were doing their job by the accuracy and timeliness with which they completed paperwork and other tasks which could be monitored remotely.

On the other hand, seafarers experienced the process of following this prescriptive system as cumbersome, overburdening and distressing. To a limited extent only, the data points to increased work demands on board. This mostly had to do with reporting requirements particularly on the part of officers. The data further suggests that seafarers had to subscribe to the prescriptive system because they were aware of the financial risks to the Company of not doing so. This commitment was demonstrated in how seriously they took rehearsals and preparations for arrival at ports with stringent requirements. It was also evident in how they interpreted unfavourable regulatory outcomes for their organization. Thus, seafarers worked harder to prevent the Company's ships from being detained or fined because they believed that their livelihood depended on the Company remaining in business. However, the evidence points more strongly to feelings of fear and distress among crew from the prospect of regulatory inspections. Besides the implications for the Company, shipboard workers were also concerned about how environmental incidents could affect their own circumstances. They feared losing their job, paying penalties or even facing criminal sanctions in the event that their ship was involved in any environmental incident.

Seafarers felt that they had a sense of ownership over the environmental protection rules and procedures to which they were subject because of the presence of a consultative framework at the Company through which they could raise problems and have these addressed by their shore-based managers. Nevertheless, there was some indication

that the environmental programmes were producing negative feelings for seafarers. This confusing perception of the EMS requires further discussion.

This chapter has thus highlighted the experience of anxiety by crew from monitoring and control measures not only by the Company to ensure shipboard compliance with its EMS, but also indirectly through regulatory inspections that seek to enforce legal requirements. Firm reminders from mangers about the necessity to pass regulatory inspections contributed to the experience of psychological stress among the crew. Indeed, psychosocial stressors in the shipboard workplace environment as evidenced by the accounts of seafarers appear strong enough in the data to suggest that crew wellbeing had been affected. This possibility is further explored in the analysis in the next chapter (section 8.2).

Performance pressure is a possible reason why seafarers reported high levels of stress from undertaking environmental protection-related and other tasks on board the ship. In Max Weber's modern bureaucracy, it was believed that bureaucratization gave firms a competitive edge over their competitors (Gerth and Mills 1948). Central in this capitalist system was the coordination and cooperation of work to increase productivity. This may be behind the use of electronic systems and related control mechanisms to achieve higher performance and extract more effort from workers. The analysis in this chapter revealed that environmental reports and other EMS-related paperwork were being exchanged electronically between the ship and the shore. Similarly, the planned maintenance system (for critical environmental equipment) and other physical control devices on board highlighted in the analysis (see section 7.1) were monitored ashore electronically. Again, because of the physical separation between ships as a unit within shipping organizations (see also Sampson and Wu 2003), communication is inevitably electronic. This electronic medium made it possible for managers to monitor and therefore influence the progress of work on board.

Electronic monitoring of workplaces and workers has been around for a while and, as it has been suggested elsewhere (see Smith and Amick 1989), these systems have not always increased employee production as intended and may have contributed to serious stress and related health problems. Although these monitoring systems have been typically used to control production in the manufacturing sectors, they have recently extended to the services sector, such as in call centres and retail pay desks. Electronic monitoring is increasingly being used to supplement bureaucratic mechanisms for controlling and

coordinating diverse forms of labour which have been divided more broadly, temporally and spatially (Greenbaum 1998). Some commentators have described this new development as a combination of both technical control and bureaucratic control (see Edwards 1979; McGovern et al. 2007). Indeed, the use of technology by firms to regulate production has long been anticipated by psychologists contemplating the future of work (Rosenbrock 1977; Hackman 1978).

However, the use of computer-based monitoring systems as described in this thesis corroborates findings elsewhere that employers are using the system for individual performance evaluation (White et al. 2004). The implementation of ISO 14001 as demonstrated in the present case study parallels findings elsewhere (see Sewell and Wilkinson 1992; Delbridge et al. 1992) that implementing a quality management system has increased companies' capacity to monitor compliance in the workplace. The data clearly point to evidence about this happening in the shipping industry.

The analysis in this chapter has highlighted differences between the understandings by ship staff and shore-based managers of company procedural requirements, particularly those within the environmental management system (EMS). In doing so, the analysis has demonstrated how the process of complying with various requirements for managing ship-source pollution resulted in poorer working conditions for seafarers. In particular, it has suggested that seafarers had experienced anxiety and stress because of some monitoring and control practices that sought to improve performance, and to increase productivity on board.

CHAPTER EIGHT: DISCUSSION

8.0. Introduction

This chapter discusses the outcomes of corporate environmental policy as presented in the findings. In reflecting on the understandings that seafarers and ship managers have of company policies and practices in relation to environmental protection, I will argue here that unlike with company safety policy, environmental requirements have been perceived by both onshore and sea-going staff mostly as enabling rather than as hindering. Drawing on the findings in the preceding three data chapters – chapters five, six and seven – and with reference to other studies which have addressed the practicalities of shipping company procedures in the area of health and safety (see for example Knudsen 2009; Sampson 2011; Bhattacharya 2012[b]), the discussion will highlight the differences that emerge when it comes to seafarers' perception of company environmental requirements. An examination of what seafarers think the Company's attitude is to environmental protection is relevant to the research question because it tells us whether the presence or absence of corporate commitment towards protecting the environment correlates with the risk of seafarers compromising their own health and safety. Additionally, it tells us whether ship staff were averse to company procedures; and whether their concerns in relation to implementing the various programmes on board were given adequate attention by shore-based managers.

The discussion also reflects on the operation of environmental programmes at the case study company, *Taf Shipmanagement*, in terms of the key issues of fatigue and risks to ship staff of inadvertent non-compliance. In doing so, I argue that some work processes which would better protect the environment, and safeguard ship staff who are carrying out the associated tasks, were not supported by the Company.

The discussion in this chapter is structured into two sections. Section one returns to the accounts of managers and seafarers at the Company about how the different environmental programmes were implemented on board the ship, and extends it to expand on the experience of fatigue and anxiety by ship staff and on the problem of exposure to hazards associated with garbage management. The second section considers in further detail whether seafarers' wellbeing may have been compromised when carrying out environmental requirements on board the ship. With reference to other studies, I

demonstrate in both sections how seafarers' perceptions regarding the impact of environmental management systems differ from what we know about their perceptions in relation to safety management systems. I demonstrate that this might be partly because seafarers feel that they have an obligation to protect the environment, and also because they are afraid of the punishment for failure to do so (see also Sanderson 2002). Additionally, the analysis in the findings chapters, when considered in the aggregate, showed that there were some conflicting and contradictory situations experienced by seafarers when complying with environmental requirements. While some seafarers (and managers) felt that environmental compliance was overburdening, time-consuming and stressful, others did not think that complying with the requirements was a problem. This contradiction in perceptions requires further discussion.

8.1. Reflections on the Company's Environmental Programmes

The analysis in chapters five, six and seven has shed light on the different ways in which the Company was complying with environmental requirements. It has also demonstrated that there are concerns surrounding these environmental practices as experienced by shipboard staff engaged in environmental protection-related tasks. The findings point to evidence of the presence within the Company of a systematic approach to identifying and managing compliance with environmental requirements. In the view of managers, the Company's environmental policy and compliance programmes, which were developed to meet regulatory requirements such as MARPOL and the Ballast Water Management Convention, were adequate for the purpose of preventing pollution from the Company's ships. For example, the analysis in section 7.1 demonstrated that managers felt that implementing these requirements strictly would ensure that the operation of their ships has no harmful impact on the environment. Contrary to this view, and as evidenced in the analysis in section 7.2, although seafarers agreed that environmental compliance mechanisms in place were necessary, they were sometimes averse to company procedures and perceived the process of complying with the requirements as stressful and overburdening. The analysis in section 5.1 showed that the company was concerned about adherence to garbage management procedures aboard its ships because most crew members were not following the rules of segregation.

These contradictions might be explained by further examining the organizational considerations that shaped the practice of complying with environmental regulations in the case study. At *Taf Shipmanagement*, environmental protection was perceived to be a key priority by both sea-going and onshore staff. The extent to which the Company was striving to foster a culture of environmental compliance, as expressed in the following quotation from one manager (Max), might easily make an impression of a very green company for new employees, third party commercial interests or even the general public. Max explains how the Company's decision to pursue International Organization for Standardization (ISO) certification of its environmental management system (EMS) was guided by the emphasis placed on environmental protection:

> *I mean when we went for 14001 [ISO certification of EMS] that was because of a reason. Because the oil majors like to see a company looking ahead you know, and we thought 14001 was the way to go. And also, it shows that the company is responsible for the environment you know, takes an interest. [...] If we can make improvements we will do. No matter what it costs. Because environmental compliance is second to none - it's as simple as that. (Max [onshore personnel 7])*

Like managers, seafarers were very clear that environmental protection was of the utmost importance at *Taf Shipmanagement*. Indeed, most seafarers acknowledged that they had become accustomed to green practices as a result of company efforts to promote an environmental compliance culture aboard the ship. One seafarer emphasized the way in which working for the Company (compared to his previous company) had enabled him to comply with garbage disposal requirements.

> *Because before I came here on board maybe I am not so following garbage management because I don't yet experienced. In locality [non- ocean-going ships] we only dispose or mix all kinds of garbage. But here in Taf ships, we have QMS [quality management system]. We read with supervision of my senior, especially chief officer impose to segregate the garbage. So I learnt a lot about segregation of garbage, which is useful. (Tim [cadet 1])*

Training is an important organizational consideration for ship staff to be able to comply with environmental requirements and to carry out their duties on board the ship confidently. The analysis in section 6.2 demonstrated that the practice of fuel changeover on ships to comply with air pollution regulations required ship staff to be suitably trained to be able to carry out the procedure correctly. The analysis in section 5.3.1 also highlighted the necessity of training for complying with ballast water management requirements. The

findings in section 5.1 further attribute the difficulties experienced by crew with complying with the garbage recycling guidelines on board the ship to education and training. The Company reported taking steps to ensure that seafarers were aware of the rules relating to environmental regulation and the environmental management programmes implemented aboard its ships. Seafarers confirmed that such training and support from the Company was taking place. When asked about *Taf Shipmanagement's* approach to environmental compliance, seafarers responded resoundingly citing drills, computer-based training, videos, posters, meetings and discussions as examples of media through which company environmental policy was communicated to them. There was a strong indication that seafarers were effectively benefiting from such training and support and that the company message regarding environmental protection was being received across all ranks aboard the ship:

> *Yeah we have a policy in our company, always posted in the ship's office. We have from the company. Our company always sending information like how to avoid and to protect our environment. […]Yeah we have meetings sometimes; crew meeting. So the high ranks like chief officer always – the designated person's assistant. So he reminds us always about environmental protection, about garbage disposal, about safety - especially safety of crew. (Zach [deck rating 5])*

> *We're making the trainings in accordance with the schedule. And also we have plenty posters everywhere; information regarding this. We're also receiving from time to time this safety information from the company, from the flag state, everything posted. Every one of the crew has access - free access to the ship's computer to find this information and read it. It's no problem. Also we making (sic) the monthly meetings or maybe sometimes an extraordinary meeting in case of a situation. So the crew are aware and we try to keep this information open for everyone. (Ken [deck officer 4])*

However, in the view of one deck officer, the training provided on board was inadequate. He argued that much of the training on environmental protection excluded junior officers and ratings, and that most of it was not provided before crew had joined the vessel. For him, such training and discussions provided on board for new recruits was late in the day:

> *[…] But the training regarding environmental safety and pollution is mostly to the senior officers; mostly they are to the chief mate and captain - it means management level officers. For us [junior officers], we are not mainly involved in such discussions or training. For the crew [ratings] [SIGHS], far way. But my suggestion is regarding environmental safety, environmental protection, especially marine life, such training, drills and discussions must be penetrated [trickle down] up to the crew member and the necessary training courses must be completed prior to employment on board. Because as for some crew members they have some*

knowledge but they got their knowledge only after they got on board. Prior to applying they don't have such discussion. Only after they get on board, some senior officers make some discussions and they understood. But sometimes their knowledge and understanding is late. They should have known these before they come on board. […](Mark [deck officer 2])

Indeed on one of the ships, I had observed that only three out of the seven computer-based learning modules on environmental awareness were mandatory for all ship staff. The remainder was mandatory for senior officers and engine officers, and recommended for designated positions on board:

[…] I found the ship's yearly CBT training schedule in the [officers' smoking] room. There were 46 training modules in all and 7 of these videos were environmental-related in scope/focus. There was a particular one which caught my attention: "It's not worth it - marine pollution offences". However, only this one and two others ("Fighting pollution - prevention at sea"; and "Waste and garbage management") were mandatory for all crew. The training video on "Marpol annex VI - air pollution..." was only mandatory for the senior officers and for all officers in the engine department; and recommended for junior deck officers and specific ratings (bosun, oiler and engine fitter). […] (Diary, 17th June 2011 [Day 13])

This might suggest the absence of any strong indication among seafarers that the training and support from the Company towards environmental protection was a veneer or perhaps that it was being provided simply to protect the Company or even at the expense of seafarers' health and safety (see also Bailey et al. 2012). For example, the certainty that the Company's commitment to environmental protection was genuine came across strongly in comments made by both onshore and sea-going staff. It is clear in the following manager's view that there was a very high level of support from the Company to ensure that seafarers could effectively fulfil their environmental protection-related duties and that such support took precedence over budgetary or commercial considerations:

[…] we will always support them. As long as they tell us; [pause] as long as they inform this office, we will pay the money to get sludge ashore, for instance. We will support them in any ways possible but, I mean even if it needs some spares and we cannot get it to the place in time we'd... what we can... fly somebody out with it, can't carry much spares but we would do that. […] (Harry [onshore personnel 1])

The priority that environmental protection has for the Company is even more strongly expressed in the following account by one engine officer about how the Company

helped them resolve a difficulty they were experiencing with the ship's oily water separator. He said the Company had asked that they seal up the equipment and use the more expensive option of discharging oily water ashore:

> *[…] For example last time it was a design: we have some three-way valve for cleaning 15 ppm [parts per million] equipment of oily water separator. But now company take it out and put directly. Simply water coming without any changes; coming directly to 15ppm equipment. It's new rule from the company so ok we carry it out. Both sides of the pipe we seal. […] It's fine now: we just discharge ashore. (Kwabena [engine officer 3])*

While these assertions might suggest that the corporate message regarding environmental protection had been clearly received by both onshore and shipboard personnel at *Taf Shipmanagement*, and perhaps that there was an awareness at all levels within the Company that environmental protection was a key priority, this was not always true. The research findings also point to the fact that a number of work processes in relation to the Company's environmental programmes were not being supported by the Company even though they lent themselves to better environmental outcomes and, in some cases, better working conditions for ship staff.

The analysis in section 5.1 highlighted instances of rules being broken at sea in relation to garbage management procedures. Seafarers complained about offensive smells from food waste accumulated on board the ship. While long term storage of food waste in a special area where disposal is prohibited was the prescribed option in the ship's garbage management plan, it does seem that the company had not provided storage containers adequate enough to cope with the waste demands of a ship trading in a restricted area. Even so, retaining waste on board the ship for disposal ashore is not the only alternative available to ships trading in special areas. The Company could have installed waste processing equipment (e.g. grinder or comminutor) so that food waste could be disposed at sea within the guidelines. This is clearly an option that would not only present fewer health hazards to crew but one which will also reduce the danger of waste being dumped overboard at sea.

The analysis in section 5.1 also demonstrated that ship staff were uncertain about the correct procedure when it came to handling medical and related wastes on board the ship. While managers attributed problems with following recycling guidelines on board the ship to seafarers' lack of basic education on green practices, it did not appear in the

accounts of seafarers that adequate guidance had been offered for the purpose, particularly in relation to medical wastes. Although it was company policy that waste items in the ship's garbage for which there were different disposal requirements, such as in the following case of some types of maintenance wastes, will be based on the more stringent requirement, and with due regard for crew safety:

> *Maintenance Waste, in particular those products contaminated with oil or toxic chemicals which are controlled under other Annexes to MARPOL, are to be disposed of in accordance with the more stringent requirements under the relevant Annex. Waste such as chemical drums should be disposed in accordance with the requirements of the Annex under which the chemical is classified and taking into account the requirements of Annex V of MARPOL. Paint drums should be usually be handled as Annex I waste as most paints used on board ship are oil based however each type of paint should be checked to ensure that the correct disposal measures are taken. Crew members handling waste of this type must use all relevant PPE throughout the operation to collect and dispose of this waste. (Company EMS Manual)*

similar hazard information could have been provided in relation to handling medical wastes on board the ship. Instead, seafarers, as shown in the analysis in section 5.1, treated the items as closest related category of general garbage categories. This suggests that the Company was not paying sufficient attention to the management of some wastes types on board. The provision of specific guidance and related training is central to ship staff safety considering the risks of infection or contamination involved with handling medical and hygiene wastes (see also Prüss et al.1999; Health and Safety Executive 2009).

The analysis in section 5.2 highlighted practical difficulties which ship staff were confronted with in relation to sewage management during port stays in strict countries. The findings showed that seafarers had complained about being unable to comply with the requirements in Turkey and that the Company had fitted/allocated extra tanks on board the ship to help the crew cope with the situation. While this suggests that issues raised by ship staff were being given adequate attention by the Company, it is not obvious whether there might be workload implications and the associated fatigue for the crew in the time that this would be taking for the Company to resolve such practical difficulties. The following view by one engine officer suggests that there were often very long waiting periods for some problems to be resolved because they did not have control over the process, and that this was causing stress amongst crew members:

> *I think it should be a combination - combination; power of the ship's staff [and] also shore. Supply; for example, supply of spare parts. Every time if we have on board spare parts, ok no problem. We can change for example, if pump is out of water we cannot wait. But when we don't have it means we have to wait one, two, three months till when it will be supplied. After that no problem. But how to work [during] these three months? How [to] discharge? How to avoid? It's headache for chief engineer; for captain. That's why if we cooperate together about it of course there will be improvement more. (Kwabena [engine officer 3])*

Research has identified such variations in the understandings of onshore and sea-going personnel of company policies in relation to health and safety (see, for example, Sampson 2011; Bailey et al. 2012; see also Bhattacharya 2012[b]). When asked about the reality of work aboard ships in relation to company safety policies and practices, it was apparent to both sea-going and shore-based staff at the case study company, *Vizla*, that the company safety message was partly regarded as rhetorical, and staff recognized that ultimately the company bottom line took precedence over health and safety concerns (Sampson 2011). For seafarers and managers at *Taf Shipmanagement*, cost was mostly understood as a consequence of non-compliance with EMS requirements. In one manager's view, any misperceptions of the priorities of shore-based management regarding environmental protection among sea-going staff had been cleared:

> *Well I believe that our management here has a very high level of commitment towards environmental safety. We discuss it often. [...] if it's been adverse then we have investigated it […] I'm not aware of any sort of flagrant disregard to environmental protection, whether it be people in the office here or on board the ships. […] We try to explain to the ship staff, if they foresee any difficulty in complying with requirements they should let us know and then we can find a solution. […]Occasionally, they may think that: "Well if we just sort of store this extra garbage it will save the company a bit of money. Our main challenge then is to say: "Well that's not something for you to worry about; it's something for you to keep us informed about and we will find a solution." (Jimmy [onshore personnel 3])*

However, in a number of instances, cost was clearly regarded as an unspoken constraint to the fulfilment of environmental protection obligations (see also Abou-Elkawam 2009; 2011). The analysis in sections 6.1 and 6.2 point to evidence that resources were actually a problem when it came to preventing oil and atmospheric pollution from the ships. The findings in section 6.2 demonstrated that managers were concerned about the workload implications associated with fuel changeover operations on board the ship. One manager had suggested that it would be better to run the ship continuously on low sulphur instead

of the current practice of switching fuels. As highlighted in the literature review (section 1.1.1), there are alternative measures which ship operators can adopt to enable them comply with sulphur emission regulations. The Company's inability to adopt any one of these measures which would save both the environment and protect the crew from fatigue and the risk of accidental non-compliance (which was causing anxiety amongst the crew) might be an indication that the Company's real concern was cost rather than preserving the environment or even safeguarding the crew.

The findings in section 6.1 also showed that ship staff were constrained in terms of the human resources needed to fulfil activities relating to the prevention of oil pollution on board the ship. Seafarers reported finding it difficult to carry out the requirements for preventing an oil spill during bunkering operations with the current staffing levels. Once again, this is an indication that the Company was more cost conscious and less environmentally-friendly as it could not do a better job of minimizing the risk of oil spills during bunkering by staffing to a higher level. This issue of cost in relation to staffing levels and how it influenced the operation of company environmental programmes on board the ship is further exemplified by the manner in which senior ship officers interpreted the quality of crews recruited by the Company. One senior officer had complained about falling standards for new recruits and he said he had previously reported this to the Company. According to him, it was "better if they [new recruits] don't touch anything. They already cost the Company money and when they touch something [it's] disaster! Then you have to pay to replace it." A similar view was shared by another participant who argued that such crew were unlikely to comply with working procedures on board because they lacked experience, and cited the accumulation of sludge on board as an example of operational problems created by inexperienced staff:

> *Now it's ok, good experienced crew [engine staff]; well trained - it's not their first time on board of the ship. […]. It's why and after that comes new people and new equipment. They don't know what to do. And maybe after that [they create] some environmental problem because they don't know what do. They create too much sludge; they try to make some escape for this law. […] Because not so experienced people accumulate too much sludge and don't know what to do. It's all problem; one problem touch another, like chain. (Kwabena [engine officer 3])*

A further suggestion that seafarers at *Taf Shipmanagement* were unable to prioritize environmental requirements over financial considerations is evident in the Company's reluctance to adopt changes which would improve recycling on board the ship

and reduce both the stress associated with sorting mixed wastes as well as the risk of penalties for poor segregation. The analysis in section 5.1 showed that in some jurisdictions, the ship could be fined for even the smallest infringements in relation to garbage disposal. The findings in section 7.2 demonstrated that the prospect of such fines was causing anxiety among crew members especially because some of them believed they could be personally fined for non-compliance. The following excerpt is an example of a problem of inadequate segregation that was being caused partly by deficiencies in the ship's garbage management plan, and which had been raised in the monthly environmental reports from one of the ships as a suggestion for improvement. The Master was concerned that the reality of work on board was inconsistent with EMS procedures and had made the following suggestion:

> *According to ship's garbage management plan we have dedicated plastic collecting bins just in the following places: pantry room, galley, EC (sic) and main on the garbage station. Meanwhile there is only one garbage bin for each personal cabin. In order to comply with EMS and SGMP [ship garbage management plan] requirements the Bosun must separate this personal mixed garbage already on garbage station [and] that unlikely happens in reality. So my proposal is to order additional steel garbage bins […] to place in each deck corridor. Finally appointed person will collect generated plastic on the daily basis and deliver it to garbage station without mixing. (Fair Winds, [Master's review of the EMS])*

One would imagine that for a relatively compliant company, such a suggestion from ship staff would be easy to adopt especially considering that it is cheaper and easier to achieve than, say, demands about increasing staffing levels to guarantee safe bunkering operations. However, one manager's reaction to this suggests concerns about the costs involved:

> *Little steps yeah, little steps. But at least you can see they're trying but then again if you go to a superintendent and say: "Right, I want three garbage bags put in each cabin on each of the 36 ships that we've got," well you're probably talking about 3,500 receptacles you know. And there's a price tag to that you know. I think that if, I mean in the ship's office as well, in the galley, in the smoke rooms, there should be segregation there you know, three bins should be there or four. (Max [onshore personnel 7])*

Thus, when it comes down to the reality of work on board, seafarers in the present case study partly felt that they were often placed in situations where they would be compelled to take decisions contrary to the Company's environmental policy. The above quotation may be an indication that written environmental procedures at the Company were not

always backed up with the requisite resources and shore-based management's commitment or action.

8.2. Perceptions of the Impact of Environmental Compliance on Seafarers' Work and Wellbeing

In this section, I will argue that whereas other studies on the practicalities of written procedures within shipping companies have demonstrated that there are often operational issues in the management of health and safety that place an additional burden on seafarers, the findings in the present study suggest that there has been no strong reaction or perceived opposition in the case of Environmental Management Systems (EMS). While seafarers partly perceive complying with environmental requirements to affect them negatively, they are not entirely averse to the company EMS approach adopted on board the ship. Reference will be made to a number of studies on the effectiveness of safety management systems (SMS) in the workplace, both within shipping companies and in land-based organizations. In comparing the perceptions of onshore and sea-going personnel about company practices and procedures towards the management of health and safety in the shipping industry, I draw attention to how these understandings differ in the case of company environmental protection requirements.

Adversarial relations between safety regulators and employers have been interpreted as counterproductive (Kemshall 2000; Dekker 2003) in relation to efforts to improve health and safety in the workplace. In some quarters, it is thought that the need for more stringent requirements on employers has not been embraced because of controversies about whether or not it would lead to improved health and safety outcomes (Haines 1997; Dorman 2000). In the case of environmental protection, the incentive for companies to comply may be described as adequate – that is in comparison to the carrot for protecting employees (or the stick for failing to do so) from occupational accidents and injuries (Sampson 2011). However, it is evident from this study that shipboard personnel were facing difficulties when complying with some environmental requirements even though ship staff and their shore-based managers felt that the Company was committed to protecting the environment. As demonstrated in the preceding section of this chapter (section 8.1), ship staff were clearly concerned about not having adequate resources for

the operation of some environmental programmes on board the ship which, as a consequence, had led to the crew experiencing fatigue and anxiety.

Previous studies which have identified related concerns among ship staff regarding compliance with safety rules (Knudsen 2009; Bhattacharya 2012[b]; Bhattacharya and Tang 2012) have highlighted poor communication and consultation, and low staff involvement in the decision-making process regarding the management of health and safety on board the ship (see also Bhattacharya and Tang 2013) as reasons why the safety management system approach adopted by shipping companies may produce negative feelings from seafarers. It has been argued that the company approach to communicating safety in the workplace would influence the attitudes and participation of workers in the safety management process. For example, some commentators have suggested that willingness by the company to listen and act on issues raised by employees in relation to working safely would not only encourage people to take part in the different safety management programmes but would also build the trust and rapport between workers and managers which is necessary for a successful implementation of safety management programmes (see for example, Hopkins 2005[a]; Vecchio-Sadus 2007; see also Bhattacharya 2012[a]). Another commentator (Hopkins 2005[b]) has advocated that behavioural safety management programmes in the workplace are more likely to work if responsibility is shifted upward within the organization. Arguing that the debate about the effectiveness of safety management systems in the workplace should not be about which approaches are good or bad, Frick and Kempa (2011) emphasize the importance of paying attention to the interpretations that workers have of these management systems and how they implement the programmes in the workplace.

At *Taf Shipmanagement*, the Company reported that ship staff had the opportunity to raise concerns about the EMS and to make suggestions about how the Company's environmental procedures could be improved through formal feedback mechanisms:

> *I mean it is quite difficult to try and keep control of what they do on board. But as I say, we do that - every senior officer or engineer that goes on board our vessels always comes to the office first as well. So we can control them that way; we can explain, we can ask them questions - they have the opportunity to ask us any questions that they want; if they feel the procedure is wrong, if they feel it should be as I say, updated, or if they just want clarification on anything. We are always available for them. (Warren [onshore personnel 6])*

While seafarers in the case study confirmed that this was happening, as demonstrated in the analysis in section 7.2, and that they were given the opportunity to influence the EMS, it is clear from the following quote by one manager that the presence of such feedback mechanisms at the Company did not necessarily bring about any improvements (see also Dahlstrom *et al.* 2003):

> *Well the feedback will come through via the master when he has his environmental meetings and that feedback would then be put onto the master's review which then comes back to me. Then I review it and make comments on it. And if there is any improvements that are being suggested, I'll then pass them to our [person's name/rank]. And she will look at it and see whether it's worthy of progressing the suggestions you know. (Max [onshore personnel 7])*

The above quotation might also mean that while the Company was keen to present itself as listening to seafarers, it was reluctant about acting on their concerns.

Contrary to what the safety management literature suggests about the relevance of worker participation in the management of health and safety at work (see, for example, Hopkins 2005[a]; Vecchio-Sadus 2007; see also Bhattacharya and Tang 2012), although seafarers in this study felt satisfied that they were involved in the EMS decision-making process, they partly resisted the environmental programmes at the Company. The analysis in section 7.2 demonstrated that there was reluctance to process paperwork among senior officers at *Taf Shipmanagement* in relation to the fulfilment of company environmental requirements. Just as in the case of the SMS (Knudsen 2009; see also Bhattacharya 2009; Ellis 2005), both seafarers and managers at *Taf Shipmanagement* perceived the reporting requirements of the Company environmental management system (EMS) as unnecessarily prescriptive and time-consuming (refer to the analysis in chapter seven for a more comprehensive discussion of perceptions about management control). One senior officer even perceived the requirements as counteracting safety. In his view, paperwork on ships was not only linked to the company EMS, and he felt that the overall aim of the international safety management (ISM) Code[59] had not been achieved because shipping companies' approach to implementing the Code was compromising safety on board the ship:

[59] The ISM Code aims not only to prevent accidents and injury at sea but also to avoid damage to the environment. Shipping companies are required to implement and maintain an SMS (of which the EMS is part) to comply with the requirements of the Code.

> *From year to year work increased – paperwork. […]It has nothing to say it's environmental. It's a paperwork – ISM Code. It's not the paperwork for environmental. It's generally paperwork. If you have a look in the beginning, ISM Code has been initially issued for international safety management code just to safe manage. But it was not completed [achieved] - it was just general things which every company reproduce for their own reason by their own opinion, whatever they decide is more safer (sic) for them; more better for them. But physically and actually, all this paper comes finally on board. And to do the physical job performance we are filling up the papers. […] I spend much more time for make (sic) the paper work. Yeah, paper work. The ISM code has been assigned to make the job easier and safer - SAFER. SAFER management. But because of paper work it's not become safer. (Fred [deck officer 1])*

This view by the above deck officer clearly suggests that the reporting requirements of the company EMS (and SMS) were being perceived among senior ship staff as serving to protect the interests of the Company rather than those of employees or even the environment. However, managers' reaction to such objections suggested that they were largely dismissed:

> *They'll always say that they've got too many forms to fill in and this isn't right, and that's not right; and it is too much. It is but they have to comply with the regulations and because it is an auditable document, we must have records to show that we are doing it correctly. (Max [onshore personnel 7])*

This further suggests that managers, as witnessed both through my personal experience and observations upon analysing a number of Company environmental reports covered in the present case study (see chapters four and seven), could effectively monitor production on board and, in addition, the performance of individual ships within the Company's fleet. The analysis in chapter four showed that environmental incidents and non-conformances were a key indicator of the Company's environmental performance within the EMS. As described in chapter four, environmental targets had been set for some of the Company's environmental programmes and these were being monitored for each ship and therefore closely linked to how well individual ships (and, implicitly, their crew) were doing. Similarly, the analysis in chapter seven demonstrated that senior officers were expected to complete periodic EMS reports and other related paperwork accurately and timely. Their inability or failure to do so was construed by managers as unsatisfactory. This also shows very clearly that managers were not listening to their seafarers after all, and as a consequence, this had led to negative feelings from seafarers about the Company's approach to environmental

compliance. As research has shown (see, for example Hopkins 2005[b]; see also Bhattacharya and Tang 2013), one of the reasons why the behaviour based approach – on which most shipboard management systems are built – has been unsuccessful in the workplace is because they tend to focus more on what front-line personnel are not doing rather than targeting their managers who play a central role in enhancing a culture of safety within the organization.

Nevertheless, the case study at *Taf Shipmanagement* demonstrates that seafarers were not entirely resistant to company environmental policy. Unlike in the case of safety management systems (SMS) where seafarers have been found to interpret company procedures as intruding and constraining (Knudsen 2009; see also Bhattacharya 2009; Xue 2012), seafarers in this study did not perceive environmental compliance or indeed the company environmental management system (EMS) as counteracting work and "seamanship". When asked about the reality of work on board ships in relation to company environmental procedures and practice, seafarers generally said that protecting the environment had not changed the way they worked. The analysis in section 5.1.2 demonstrated that there was no strong perception about increased workload or conflicting requirements from following company environmental rules among seafarers. The crew said the impact on their workload was minimal and that they had taken it in their stride. According to them, environmental protection-related tasks on board were just "normal work" and they had been carrying out some of the requirements for a very long time.

The perceptions of seafarers in this study about the impact of environmental procedures on their work and life aboard the ship may have been influenced in part by a feeling among crew of a moral responsibility towards the environment (see also Abou-Elkawam 2011). In the view of one rating, managing garbage and performing other pollution prevention activities on board the ship was an integral part of their work and it was neither demanding nor time-consuming because they had a responsibility to protect the environment after all:

> *It doesn't affect. Also you spend time - a little time but it's good because you are protecting the environment. There is no big deal about that even though you spend one hour in sorting the garbage. It's a good thing because you are saving also the environment. That's a good one. (Gary [deck rating 3])*

Another seafarer, in the following extended quotation, similarly emphasized the way in which environmental compliance had imposed an additional burden on seafarers but he nevertheless felt that the impact was minimal against the perceived benefits of protecting the environment:

> *Akwasi [deck officer 6]: Actually, yes a little bit [pause] more work for us unlike before you just take everything easy. But now it's additional work for us but it's [pause] not really hard work. But only additional work but this additional work in exchange for that it's good for our world - for everybody; for the environment because...not only for us but for the children of the future. Otherwise if everybody is not caring for the environment then it's very bad future for the next generation.*
>
> *Researcher: So if you compare many years ago and now, do you find that you spend more time at work now than before?*
>
> *Akwasi: Yes, a little bit more time because I remember before, you don't need to separate all this garbage. Everybody is throwing [laughs] in the sea. But now no. So you have to go and everybody collect and everybody must cooperate now.*
>
> *Researcher: Is it very demanding; is it a difficult thing to do?*
>
> *Akwasi: No, [it's] not really difficult. If you will just think it over it's [pause] additional work is not really a burden for us but we think it will help us; everybody will...it's a great help for us and especially for our children. […]*

In instances where seafarers felt that work on board the ship had been affected by environmental requirements, they did so hesitantly. Of those who felt they had been somewhat affected, the problem seemed to be with exasperation from carrying out waste and garbage management-related tasks. The analysis in section 5.1.1 showed that managers blamed the failure by crew members to adhere to the guidelines for collection, segregation and disposal of garbage on board on cultural factors (seafarers' social background) and inadequate training. However, as highlighted in the first part of this discussion (section 8.1), resources were a problem when it came to improving recycling on board the ship. Failure by the company to provide adequate training for managing some waste types (e.g. medical and hygiene wastes) and to back recycling programmes on the ship with adequate resources had put ship staff in a situation where they were likely to infringe garbage regulations or even face the risk of penalties or other sanctions. The exact nature of the problem is probably more vividly exemplified in the following quotation from one deck rating who complained about the mixing of cigarette butts with food waste:

[…]You know I have more difficulties experiencing that sorting of garbage. When you go to America; single bucket there with the food waste with cigarette butts. Yeah. Fuck them! Sometimes I put my gloves, sometimes people are throwing also like this; before we go to the port I have gloves [in readiness]. Because I am the one [they] will blame. […]Sometimes I am pissed off but I realize this is my work; just make patience. (Gary [deck rating 3])

The above quote suggests that problems with recycling on board the ship were causing psychological stress particularly among staff ultimately responsible for sorting the ship's solid wastes. Seafarers' inability to comply with the ship garbage management plan was arousing a feeling of angry frustration among affected seafarers on the ship.

The Company's failure to provide adequate training and resources to support recycling programmes on board the ship was also burdening affected crew with extra work demands. Sea-going staff who were responsible for sorting the ships aggregate garbage complained that people did not dispose waste in the appropriate bins and they were not happy about having to separate it all over again. According to one of them, it was not easy to deal with mixed wastes and it took a long time to sort:

Sometimes it is mixed. That's what I hate also - mixed - because it is not easy to separate garbage. (Serge [cadet 2])

The discussion so far has developed the perceptions of ship staff and managers about the impact of environmental compliance in terms of how it affected seafarers' work on board the ship. In the following sub-section, I will continue this extended discussion of the impact of environmental compliance on seafarers but this time focusing on the perceived health impacts of complying with environmental requirements.

8.2.1. Seafarers' Perceived Health Impacts of Complying with Environmental Requirements

Seafarers at *Taf Shipmanagement* generally did not view the Company's environmental policy as conflicting with health and safety requirements (see also Grey 2010). Concerns about various forms of personal injury and hazards to onshore workers from the fulfilment of environmental protection-related tasks were highlighted in the literature review (see section 1.4). An analysis of injury reports at *Taf Shipmanagement*

highlighted a growing number of cases (see section 4.5.4) but did not find any evidence to suggest that seafarers may have been affected directly by performing specific environmental protection-related tasks, for example in relation to cleaning up oil and chemical spills. The analysis in section 5.3.2 demonstrated that ship staff were reluctant to carry out ballast water management partly for fear of "contaminating" the ship's ballast water with traces of oil on deck during the overflow (see also The Nautical Institute 2008). The findings in section 6.1.2 also showed that the crew had to clean up traces of oil and similar pollutants on deck to prevent these substances from mixing with rainwater draining overboard. Both seafarers and managers in this study reported using what they perceived to be benign and environmentally-friendly chemicals when dealing with operational spills and accidental discharges of oil and chemical substances on board the ship. For example, according to one seafarer, chemicals such as thinner, diesel and dispersants were used as solvents on rags to clean stains, grease and small oil spills:

> *Ah yeah, sometimes because also the deck - even the vessel has crane; some grease is thrown on deck so they use some chemical - the same [one used] for [cleaning] oil. So put the rags, little chemical on the rags and they clean so that if it rains no leak will spill [wash overboard]. (Yoofi [engine rating 4])*

The above example serves to suggest that environmental requirements are not perceived to be presenting seafarers with new health hazards except where excessive care in removing all traces of oil leads to exposure to chemicals such as thinners. The likelihood of exposure or skin contact with oil and chemicals can be significant during cleaning-up of everyday small spills on deck (see also King and Gibbins 2011). Seafarers used what they believed to be "safe" and "environmentally-friendly" products and as a result, they may have been careless or even ignorant about the health hazards to them from inadequate handling or usage of cleaning agents. According to the Company's personal protection equipment (PPE) matrix (see Appendix 7), gloves, protective clothing, safety shoes, and face and eye protection were mandatory for most shipboard tasks involving the use of chemicals. The material safety data sheets (MSDS) for most cleaning (and other) chemicals used on board the ship required additional forms of protection. For example, whereas most safety data sheets for *Seaclean*[60] recommend respirators, gloves, goggles and suit to be worn, one deck rating in the following excerpt reported that only "rubber gloves" were used when working with the substance:

[60] The use of product or manufacturer name(s) in this study is for illustration only.

Yeah for example, Seaclean but that is no problem to our environment; Seaclean to clean sometimes grease. We wear rubber gloves and use rags to clean and to collect. (Nick [deck rating 2])

The Company did have in place a Shipboard Marine Pollution Emergency Plan (SMEP) to provide guidance to crew for dealing with oil and other marine pollution incidents on board the ship as required by law. However, it appeared from the accounts of seafarers at *Taf Shipmanagement* in relation to preventing oil pollution (see analysis in section 6.1.2) and from the company risk assessments (see section 4.5.4) that there was no clearly worked-out plan or method for dealing with pollution incidents of a much smaller magnitude or infrequent occurrences (e.g. refrigerant oil leaks from cold-chain[61] cargo or chemical/oil leaks from other cargoes). This suggests that safety of crew can be compromised when responding to minor spills. Similarly, whereas the Company's risk assessment covers chemical and oil spill clean-up procedures, the guidance does not emphasize the safety of shipboard personnel when managing these marine pollution incidents (see also MCA 2012). Consequently, in an emergency, the risk of exposure or injury from clean-up operations could be even higher because of the emphasis on environmental performance. The crew may feel rushed or pressured and would tend to focus more on the clean-up effort rather than on personal safety.

It was generally obnoxious smells and the risk of contamination from bacteria in decomposing food waste that seafarers identified in relation to garbage management rather than acute biological hazards. The analysis in section 5.1.2 demonstrated that when asked about their experience of illness or injury and the possibility of this arising from pollution prevention activities on board the ship, seafarers generally said they did not feel exposed to any risks or health hazards. The findings also showed that job experience and the use of personal protection were advanced by some seafarers as reasons for not being exposed to any health hazards from managing garbage. However, seafarers who were concerned about illness and injuries from protecting the environment mostly cited offensive smells and the risk of contamination from bacteria or germs in food wastes which been held on board for too long. As demonstrated in the analysis in section 5.1.2, and later highlighted in the first part of this discussion (refer to section 8.1), the retention of food waste on board the ship for durations longer than prescribed within the garbage

[61] Some shipments contain products which are temperature-sensitive (e.g. pharmaceuticals and fresh foods) and therefore require refrigeration during transportation. These are carried in special containers.

management plan was a case of ship staff breaking the rules or waste recycling at sea because of lack of adequate resources from the Company. While unpleasant smells from the decomposition of food wastes retained on board may not necessarily present a health hazard to crew responsible for sorting the ship's aggregate garbage, another deck rating who felt exposed to health risks from contaminated garbage warned about the necessity of personal protection:

> *Yeah normally, but if you do the job you must be sure that you are in protective clothing. If you do, you use gloves so that if there is contaminated garbage, before it hits you it will go first for the gloves. Then after you just wash your hands with soap so that the germs will go away. (Kodjo ([deck rating 9])*

Similar perceptions of the risk of contamination when handling were identified in seafarers' accounts in the analysis in section 5.1.2 but the findings also pointed to inadequate and sometimes poor protection on the part of ship staff handling garbage. For example, the analysis in section 5.1.2 showed confusing and unsafe practices amongst crew when handling medical and hygiene wastes on the ship. Once again, this unsafe behaviour and inconsistent practices might be happening because the Company was not giving sufficient attention (in the form of training and resources) to safe working in relation to all aspects of garbage management on board the ship. Indeed what might seem to be complacency about health and safety risks, as demonstrated in the analysis in section 5.1.2, has been linked to factors operating within organizations which contribute to the behaviour. Hopkin's (2005[a]) essay which examined problems involved in a programme for repairing fuel tanks on combat aircraft at the RAAF showed that while workers had suffered injuries as a result of not wearing personal protective equipment (PPE), it was the lack of attention by the organization to problems raised by the workers (including those associated with the PPE) which had contributed to the injuries in the first place. The problems with PPE use and unsafe behaviours among ship staff sorting garbage, as identified in the analysis in chapter five, may also be due to seafarers' inability to make sensible decisions regarding what safety precautions to take when performing the task. The existence of safety rules serves to control risks in the workplace. However, because these are often too many or complex, there is the danger that workers' reliance on the rules might cloud their awareness of risk (see Hopkins 2005[a] on the Glenbrook train crash; see also Hopkins 2005[b]). As such these workers would be unduly exposed to hazards where the Company had not properly risk-assessed a particular activity. For example, seafarers could use

chemicals more cautiously when cleaning up pollutants on deck (an example discussed earlier in this chapter) if they did not rely solely on managers' word that the substances were safe and environmentally-friendly. Similarly, ship staff would consider using appropriate personal protection when handling wastes which were not covered by the health and safety procedures within the Company EMS/risk assessment.

Although ship staff in this case study generally reported adhering to safe working practices when operationalizing company environmental requirements, there was some indication from the crew to suggest that implementing company environmental programmes on board the ship may conflict with compliance with other statutory obligations such as hours of rest. In the case of safety management systems (SMS), Knudsen (2009) demonstrated that adherence to company safety procedures often meant that seafarers' hours of duty would be inconsistent with legal requirements. Similarly, seafarers at the case study *Vizla* (Sampson 2011) understood that they had to keep the vessel running whether or not the ship had not been adequately resourced to enable compliance with regulatory requirements or even when this would result in fatigue or risky practices (see also Bailey et al. 2012; Olser 2012; Bhattacharya and Tang 2012). There is evidence to suggest that seafarers at *Taf Shipmanagement* were in a similar situation because of the need to adhere to company environmental requirements (see also Abou-Elkawam 2009). The analysis in chapter six (see section 6.2) demonstrated that because of work patterns on board, staff in the engine department were susceptible to working during their hours of rest. The crew had complained about having to do overtime during late night arrivals and departures – duty hours during which critical environmental requirements such as fuel changeover had to be carried out. According to one engine officer at *Taf Shipmanagement*, the Company had dismissed such complaints arguing that the crew were not "managing their time" effectively.

The analysis in chapter seven (see section 7.2) also showed that ship staff reported high levels of stress and overwork as a result of complying with pollution prevention procedures on board the ship. As demonstrated in the findings in section 7.1, managers attributed some of the pressures that were being forced down on ship staff to commercial requirements by business partners. Similarly, ship staff understood that they had to comply anyway partly because they were concerned about the financial implications for the Company in the event of non-compliance (e.g. a detention or large fine) and also because they were afraid of the harsh penalties for infringing pollution regulations. However, this

could only be achieved at the expense of seafarers' wellbeing (see also Grey 2010; Bhattacharya and Tang 2012). As a consequence, ship staff were overburdened, fatigued and stressed in the process. The findings in relation to seafarers' perceived health impacts, as discussed in this sub-section, also suggest that managers were "misusing" the EMS by focusing on the prevention of environmental incidents while ignoring the health and safety outcomes of their workers' compliance with EMS requirements (see also Frick and Kempa 2011).

8.3. Concluding Observations

The discussion in this chapter has highlighted the ways in which written procedures within shipping companies can result in similar but differentiated outcomes for seafarers between health and safety policy and environmental management systems. The discussion has shown that seafarers can find themselves in situations where they are compelled to compromise their wellbeing on board the ship when complying with environmental requirements because of inadequate supporting logistics from the Company. The prospect of being penalized by regulatory authorities for not complying also loomed large amongst ship crews. In spite of the existence of these constraints, ship staff are not entirely averse to environmental protection programmes at the Company. Seafarers' demonstration of a strong understanding of the rationale for protecting the environment in this study parallels with the framing of pollution by ship staff in a closely related study where seafarers from both developed and developing countries understood the need to preserve the environment in a similar manner, particularly in terms of the benefits to posterity (Abou-Elkawam 2009). Similarly, seafarers' concerns about punitive enforcement of pollution controls at sea can be seen as part of a wider development in the corporate sector where there have been perceptions of unfair and unequal imposition of regulatory burdens particularly in terms of how other regulatees comply (Levi 1988; Levi 1997; Aoki et al. 2000).

The accounts of seafarers in this study partly suggest that rule following in the case of the EMS may have compromised safe working practices on board or even undermined seamanship. Although ship staff were not entirely averse to the company EMS, they interpreted procedural controls within the company EMS as intrusive and undermining those qualities (e.g. autonomy and discretion) that are integral to "good" seamanship.

These negative feelings were expressed in the form of reluctance to paperwork among senior officers, concerns about hours of rest from engine crew and a feeling of angry frustration from the mixing of solid wastes among crew ultimately responsible for sorting the ship's garbage.

The risk of contamination from germs in rotting food waste which seafarers identified in relation to garbage management and the possibility of coming into contact with oil and chemicals when cleaning small spills on deck, reveal a potential for low-level exposure to biological and chemical hazards among ship staff. While there is only little indication about perceived health impacts from ship staff exposure to occupational hazards when fulfilling environmental protection-related tasks aboard the ship, the scale of this impact is not negligible when one considers other risks inherent in the shipboard environment which seafarers are continually exposed to.

The low perception in this study that protecting the environment may present health hazards for shipboard workers supports the conclusions of other studies that sea-going populations are generally healthy (Charpentier et al. 1993; Inskip et al. 1997; Thomas et al. 2003; Acejo et al. 2011). The fact that ship staff did not report health problems associated with cleaning up marine pollutants is also not surprising considering that there is little understanding to date on human health toxicity from using chemicals to combat oil spills and of the toxicity of mixed occupational exposure to oils and chemicals (NIOSH and OSHA 2010; see also Boman 2012).

Similar to studies on seafarers' perceptions regarding company attitude to safety where financial and economic considerations have been shown to play on decisions about prioritizing health and safety on board the ship (Knudsen 2009; Sampson 2011), in the context of the EMS it also appears that resourcing the ship in response to regulatory requirements would mean squeezing the budget in relation to competing priorities. Priority was given to the commercial operation of the ship over the means needed to support recycling programmes and emission control on board the ship. In a related study, such economic considerations have been further demonstrated to play on the minds of both managers and seafarers even for decisions regarding environmental protection. Abou-Elkawam (2009) argues that in a highly competitive and commercially driven sector, shipping companies have often required sea-going staff to deal with waste and garbage disposal requirements aboard the ship in a "cost-effective" manner. While the perception at *Taf Shipmanagement* is different, when it came to protecting the environment,

budgetary constraints were sometimes an issue for both ship staff and their shore-based colleagues. It follows that while some shipping organizations may have a very good environmental compliance record, their performance in relation to the health and safety of front-line personnel may not necessarily be comparable (see also Hopkins 2005[a]; Frick and Kempa 2011).

Finally, unlike with safety management requirements where seafarers have been cynical about the company safety message (see Bailey et al. 2012), seafarers in this study generally believe that the Company's attitude to environmental protection is sincere and that they get support. However, ship staff feel that this support is inadequate in relation to some work process which could help them comply consistently and also safeguard their wellbeing in the process. The perceptions of ship staff as demonstrated in this case study suggest that the Company is not entirely compliant and that this level of commitment by the Company is likely to increase seafarers' risk of compromising their own health and safety.

CONCLUSIONS

This closing chapter sums up the main findings of the study. In this chapter, I highlight how my research contributes to what we know about the daily practice of pollution prevention at sea and how complying with environmental standards may impact upon worker roles and wellbeing. Using the example of the merchant shipping industry, the chapter examines how this thesis answered the question: "In which ways have global environmental standards affected workers?" The shipping industry is just an example of a sector where global pressures surrounding environmental compliance are being felt sharply. Thus, an appreciation of the experience of workers at sea can offer us an understanding of the current challenges confronting workers engaged in similar activities on land.

This chapter presents the main findings of the research, what the results suggest and how they apply more widely. It further identifies a number of secondary findings that emerged from my fieldwork and which had an indirect but equally important influence on the implementation of environmental programmes on board the ship. In this chapter, I also revisit the research process and reflect on what I learnt from doing the study as well as discussing some of the research limitations. In the final section, areas for further research emerging from this study are described.

This research derives from both public awareness about the negative externalities produced by the activities of commercial shipping, and from the growing demand on shipping companies to become more environmentally responsible. While in Europe and the United States the industry has embraced the idea of sustainability with much dynamism and has in many cases been largely compliant with legal requirements for protecting the environment, little is known about what this means for front-line personnel who have final responsibility for fulfilling these requirements. In the last decade, the industry has been roused by concerns about the implication of individual seafarers in deliberate acts of infringement of environmental regulations and the reasons for such infringements. Notwithstanding this interest, to date there have been no systematic studies about why infringements continue or indeed what the work experience is for ship staff fulfilling pollution prevention requirements at sea. In addition, only limited scholarly work exists about the impact upon worker roles and the wellbeing of workers performing environmental protection-related activities on land and, even though the spectrum of

these activities is much broader on board ships, very little is known about the consequences for workers in the offshore sector. For these reasons, this research is timely in examining the ways in which seafarers have had to adapt to new procedures on board relating to compliance with environmental regulation, and further considering how such procedures might impact upon their wellbeing.

This research was initiated to explore the issues surrounding compliance with legal obligations designed to protect the environment at the shipboard level of the maritime industry. The aim is to advance current understandings of the impact on worker roles and wellbeing of complying with environmental regulations in the workplace and also, to make an intellectual contribution to this largely under-researched area. In addressing the research question, I have considered the following two additional questions: (1) How have shipping companies responded to global environmental regulation; and (2) What is the impact of environmental compliance programmes on seafarers? To examine these questions, this research focused on the perceptions that onshore and sea-based staff at one shipping company (pseudonym "Taf Shipmanagement") had about the operation of the environmental compliance strategies implemented by this company. The literature review which examined environmental programmes in a number of land-based sectors showed that there had been changes in the way in which employees went about their work, and that there were a number of significant occupational health risks emerging from complying with environmental regulations. Prominent among these were concerns about the immediate and long-term adverse health effects of worker exposure to toxic substances, physical agents, biological hazards and psychosocial stress when carrying out environmental protection-related activities. These observations, as set forth in the literature, paved the way for the present study to explore the perceptions of managers and seafarers about company environmental policy and the operation of related programmes aboard the ship. Specifically, ship staff were asked about their practice of implementing the programmes and whether they had experienced any adverse job-related consequences. Managers were asked whether they thought compliance would impact on the work of seafarers and if so how.

The research questions were addressed using a single case study approach. A combination of research techniques was applied to this end, namely semi-structured interviews; observational methods including fieldnote making; and documentary analysis. As described in chapter three, the research investigated the practice of complying with

environmental regulations in a single, large, global ship management company. I conducted the interviews in the operational headquarters of the company, as well as on board two of its ships. A total of 7 shore-based and 34 shipboard interviews were audio recorded and subsequently transcribed and coded using ATLAS.ti, a qualitative software analysis package. Together with these interviews, I recorded fieldnotes and collected and analysed a number of company documents. By employing this method, I was able to generate elaborate data for a better understanding of the practice of complying with environmental rules at the company. The data analysis allowed for a theoretical discussion of my interpretations about the circumstances that shaped the practice and about its impact upon worker roles and health.

Summary of Findings

This thesis has examined whether or not the work on board ships has changed as a result of environmental regulation and in what ways these changes might be perceived as damaging to seafarers' health. The study has found some evidence to suggest that seafarers have been affected by the fulfilment of environmental protection-related tasks on board the ship. Seafarers have been affected in the sense that they now have extra duties. However, ship staff do not regard this development as significant in relation to the quality of their work and life on board the ship. The analysis also reveals a potential for occupational hazards to health. This research found that while the potential for exposure to hazards when managing garbage was found to be relatively small, seafarers were at risk of low-level exposure to oil and chemicals when responding to pollution incidents on board the ship. Even so, shipboard workers were disinclined to worry about the risks as they believed that their daily work did not pose any threat to their health and personal safety. Seafarers did report high levels of psychosocial stress linked to organizational factors in the fulfilment of pollution reduction tasks. Overall, it was mostly psychosocial stressors rather than occupational exposures that seafarers were concerned about in relation to environmental compliance.

Psychosocial Stress and Organizational Factors

Seafarers in this study did not generally perceive the practice of pollution prevention to have changed their work on board the ship. This may be as a result of changes being made incrementally in companies such as *Taf Shipmanagement*. It could also be a consequence of the fact that seafarers are generally employed on temporary contracts and are therefore accustomed to being required to adapt to the new demands placed upon them by different employers. As such, changes in their daily work routines may pass relatively un-noticed or unremarked. However, this research identified a potential for the increased experience of job stress among seafarers from the performance of pollution prevention-related tasks aboard the ship. Prominent among the consequences were: anxiety about regulatory inspections; exasperation with reluctance by their colleagues to comply with the ship's garbage management plan; and physical fatigue from the fulfilment of oil and atmospheric pollution prevention-related tasks.

Uncertainty over the outcome of regulatory inspections in relation to environmental management resulted in anxiety among ship staff. The analysis in chapter seven showed that rehearsals and extra activities on board the ship when preparing for arrival in countries known to practice strict regulatory enforcement, and firm directives and reminders from the company about the need to comply with environmental requirements in these ports aroused a feeling of anxiety among the crew. In particular, ship staff were concerned about the financial implications for their company in the event that the ship was found to be non-compliant with environmental regulations by authorities in those countries. They perceived any negative outcomes for their company arising from such regulatory inspections to affect their employment and therefore their livelihood. The analysis in section 7.2 describes how they worked hard to prevent non-compliance and how failure to contain pollution incidents left them feeling depressed.

Seafarers were further confronted with the feeling of fear and distress because they were concerned about what could happen to them individually in the event that they inadvertently breached environmental requirements. The analysis in chapter seven showed a strong feeling of resentment among ship staff towards penalties for not following recycling guidelines at sea. Like ships, households and other land-based organizations have been fined for incorrect waste disposal. For example, in 2011, Cardiff Council introduced kerbside caddies as part of its waste strategy aimed at increasing recycling (Cardiff Council 2011) and these were barcoded to implement fines to households who do not comply with

the council's recycling guidelines. As the present study has shown, seafarers are not indifferent to being fined and they are even more likely to suffer anxiety from the prospect of a (comparatively bigger) fine. This might be because of their awareness of the financial implications for their employer and perhaps also because they had been led to believe that they would be personally fined for failing to comply with the ship's waste management plan.

It therefore seems that in companies such as *Taf Shipmangement* where there is a strategy in place for ensuring environmental compliance, ship staff may feel insecure because they believe that they would be held responsible for non-compliance. The threat of penalties alone could contribute to job-related stress among shipboard workers. This feeling of fear of the prospect of penalties raises the question of whether employers are doing enough to protect seafarers from criminal sanctions. Whereas the compliance strategies being implemented by shipping companies are necessary to ensure that ship staff understand their role and responsibilities, it is not clear whether these are sufficient to increase seafarers' confidence in going about their duties. This is not surprising in a globally regulated and offshore industry like shipping, where additional standards often apply in some jurisdictions, and seafarers may not always be up to date with the local requirements for recycling in different parts of the world or even receive adequate and timely information and support from their shore-based colleagues and superiors necessary to meet these requirements. What is more, violations of these requirements can result in criminal charges against senior ship officers, lower level officers and other crew members (see, for example, US Department of Justice 2005). Among these, cases of oil pollution have received the most punitive prosecutions, especially in jurisdictions such as the United States where mariners can be fined up to US$ 250,000 per individual crew member for each count and imprisoned for up to five years (Coutu 2005). Other prosecutions that are of concern are cases where action has been brought against seafarers before the matter is admitted or established in court (see BIMCO 2006). Whilst the enforcement of criminal sanctions may be necessary to deter deliberate infringements, the wider question remains whether the damage caused to seafarers involved and on the image of seafaring as a career is an acceptable price for the shipping industry to pay (see also Becker 1968).

The study found that seafarers were exasperated by the reluctance of their colleagues to adhere to garbage management procedures on board the ship. The discussion in section 8.2 revealed a feeling of angry frustration among crew members

responsible for sorting the ship's garbage. They reported that mixed wastes were difficult to sort when these had not been disposed of correctly and that the process was time-consuming as they paid extra attention to remove any mixed items. While this might mean more work for affected crew members, it also raises the issue of how effectively the company was addressing poor recycling behaviour among ship staff. Studies about the behaviour of land-based workers when complying with green practices in the workplace show that proper resourcing of recycling programmes can potentially impact on compliance levels. For example, the proximity and positioning of recycling receptacles and prompts has been found to increase recycling among office workers (Austin et al. 1993; Brothers et al. 1994). The discussion in section 8.2 demonstrated that seafarers were reluctant to follow garbage management procedures because they were finding it difficult to comply with the guidelines. They believed that they could comply more easily with the right resources, for example by having separate waste receptacles in their cabins to sort garbage in advance. However, managers were reluctant to support such demands from ship staff because of the cost implications. This opens an interesting debate about whether shipping companies are providing the correct level of resources to enable seafarers comply with the different requirements more easily and whether managers are giving practical problems raised by ship staff enough attention.

Overall, seafarers did not interpret the job of pollution prevention at sea as demanding. This might be because they find it difficult to identify changes in their work tasks especially considering that environmental protection is only incidental to their role as sailors. However, when talking to them it appeared that fatigue from expanding work demands imposed by environmental regulation could contribute to the psychosocial stresses which seafarers might otherwise experience. There was a particularly strong perception about fatigue from overwork among those seafarers working in the engine department. The analysis in chapter six demonstrated that the way work was designed and performed in the engine department, and organizational practices within the company in relation to staffing, increased the risk of fatigue among seafarers working in this department. The analysis in section 6.1 identified oil pollution prevention during bunkering as an activity which seafarers experienced as overburdening and time-consuming. Similarly, the analysis in section 6.2 revealed that because the engine room was short staffed, engineers responsible for controlling the ship's emissions through fuel switching were susceptible to working overtime when the need for this operation arose outside normal working hours. What is more worrying is that these expanding demands are occurring at

the same time that the shipping industry is experiencing problems with the supply of engineers (BIMCO and ISF 2010).

The potential for experiencing psychosocial stress from work is not unique to shipboard workers. The pattern of job stress factors which workers in the shipping industry perceive as damaging is remarkably similar to that elsewhere. In a recent work stress survey (Corinthian Colleges 2012), American workers reported annoying co-workers as the second most stressful aspect of work, and unreasonable workload came in fourth place. The survey also found that American workers were likely to be stressed in relation to job security but only a small number of them reported fear of being fired as a concern. Overwork, fear (see, for example, Cobb and Kasl 1977; Heaney et al. 1994; see also Burgard et al. 2012) and problems with colleagues are undoubtedly among well-documented sources of work-related stress (see also Burke 1988). While the present research findings do not offer a causal explanation of stress and related illnesses amongst seafarers from the fulfilment of environmental programmes on board ships, they do, however, allow us to speculate on the impact of work characteristics at sea on stress and health. The findings also add to the view that stress in seafarers is a complex problem. The high levels of stress reported by seafarers in this study suggests that the potential for experiencing stress among sea-going workers may be felt across all ranks and could be a combination of several different factors including, performance pressures from the demands of the job, anxiety from regulatory uncertainty and fatigue from overwork. This finding is intriguing in the light of the debate about whether stress may be necessarily related to hierarchy or responsibility as contended by models of work-related stress (Karasek 1979; Karasek and Theorell 1990). It also shows that perhaps all seafarers today feel that they have responsibility without autonomy or authority.

Chemical Exposure and Other Hazards

This study did not measure whether seafarers had been exposed to dangerous levels of toxic chemicals or other substances hazardous to their health from carrying out pollution prevention activities on board the ship. However, what might constitute an area for concern is a potential risk of worker exposure when removing traces of oil on deck in order to comply with anti-pollution regulation. The discussion in section 8.2 suggested that seafarers can be at significant risk of coming into contact with oil when cleaning spots of oil on deck. The discussion demonstrated in effect that because ship staff are using what they

believe to be eco-friendly cleaning agents to remove small oil spills on deck, their attitude is casual and therefore they may not use adequate personal protection. The discussion further revealed that there are no instructions and training for seafarers in less critical situations like these and that ship staff have to figure it out as they go along.

The extent and causality of long-term occupational health problems among workers exposed to chemicals and oil when responding to pollution incidents is unknown. While epidemiological and toxicology studies (ATSDR 1995; King and Gibbins 2011; IARC 2012) have found significant dermal and pulmonary exposure to fuel oils to be associated with various adverse long-term health effects, the extent to which workers such as seafarers, who are not continuously exposed and amongst whom exposure relates to smaller amounts, may be affected remains unknown. Nevertheless such evidence might be expected to be taken seriously enough to encourage companies to take greater steps to make sure that exposure to chemicals and oil is minimized.

Again, this research showed that seafarers do not perceive removal and sorting of solid wastes on ships as damaging. However, during detailed discussions with them, seafarers in this study were rather concerned about noxious smells and, to a lesser extent, the risk of coming into contact with bacteria from decomposed food wastes on the ship. Occupational health problems are known to be common among workers in the waste sorting and recycling industry. In particular, severe pulmonary diseases have been reported among workers in garbage sorting plants from airborne microorganisms in decaying waste (see, for example, Malmros et al. 1992). But there have been other health problems too. Epidemiological studies of solid waste workers on land (see Poulsen et al. 1995; see also Porta et al. 2009) also indicate that workers at transfer stations, landfills and incineration plants are at risk of musculoskeletal and gastrointestinal problems. This may be because of the physical effort involved in the job rather than contact with waste of course. Once again, it is difficult to estimate the risks associated with intermittent contact with solid wastes at sea. However, the evidence that is available could be considered sufficient grounds for taking the potential for harm amongst seafarers sorting garbage on board more seriously.

Although there were no reports of health problems which could be attributed to sorting waste on board the ship, there could be more dangers for those crew members who are responsible for sorting the ship's aggregate garbage. The findings showed that waste was sorted manually on ships – a practice which has been prohibited by labour inspectorates in some jurisdictions on land (see Malmros et al. 1992) – and that in most

cases, ship staff did not use adequate protection when sorting garbage. In particular, the analysis in section 5.1 demonstrated that ship staff could be potentially exposed to infectious garbage from manual handling of hygiene and medical wastes. Poor management of medical wastes has been found to expose health care workers and community waste management workers on land to a variety of infections, toxic effects and injuries (Prüss et al. 1999; WHO 2011[b]). Waste from the ship's hospital is normally segregated at the point of generation thereby reducing the risk of contamination from incorrect disposal. Also, unlike healthcare waste workers, ship staff involved in garbage sorting are only performing the task occasionally. Nevertheless, seafarers do not have to be continuously exposed to be at risk of contamination from incorrect or unsafe disposal. Contamination could occur through unexpected or infrequent items being disposed of in the ship's garbage.

Seafarers did not perceive activities relating to the management of sewage on board the ship to affect their health adversely. This might be because the sewage treatment process on ships is largely automated often involving only a single crew member so that only a comparatively smaller proportion of workers may be at risk. Epidemiological studies have identified concerns among workers in other sectors. Recent studies of sewage workers at wastewater treatment plants on land (Albatanony and El-Shafie 2011) have confirmed a high risk of occupational infections and cardiopulmonary diseases among these workers. However, apart from exposure to harmful gases, the ways in which land-based sewage workers come into contact with hazards (Friis et al. 1993; Ambekar et al. 2004) are not comparable to the wastewater treatment process on ships. Thus, unlike their colleagues on land, wastewater treatment workers on ships may not come into contact with the same hazards that their colleagues on land do. One possible explanation lies in the fact that because seafarers are not full-time wastewater workers at sea, they are only exposed to these toxic gases and bacteria intermittently. In any case, the extent of seafarers' exposure to these hazards is unknown and of doubtful significance in comparison to land based sewage workers who are exposed continuously throughout the whole year.

Taken together, the potential for seafarers' exposure to the above occupational health hazards appears to be much smaller than that associated with specialist waste workers on land. However, it is not possible to assume that this makes any associated risk insignificant (see also WHO 2011[a]).

Whilst this concludes the outline of the main findings from the study, this research also highlighted important contextual factors that influenced the practice of environmental compliance at the company. These secondary findings show that shared perceptions between workers and managers in this study, about what constitutes compliance influenced how effectively the company's environmental programmes were being implemented on board the ship. I present these in the following section.

Shared Perceptions between Seafarers and Managers about Compliance

The findings from this study show how the practice of complying with environmental rules was dependent on the relationship between the perceptions of managers and seafarers about what constitutes environmental compliance. Managers and seafarers in this study had broadly similar understandings of the role of environmental requirements in general and of the company EMS in particular. The evidence is more predominant for practices relating to the management of sewage and ballast water than it is for other environmental programmes on board the ship. This may partly be a result of the largely automated nature of these programmes on board the ship which therefore require very little crew involvement in the processes.

In locating this congruence in perceptions, this research further highlights the fact that it is increasingly important today in the shipping industry for companies and their sea-based employees to adhere to programmes and requirements for ensuring environmental compliance on ships. The significance of shared perceptions about environmental compliance is of particular interest within the shipping context especially because the risk of making a mistake can be very costly, and also because there is scope for action to be brought against both the company and crew for incidents arising from non-conformities. As demonstrated in the analysis in chapter seven, both managers and sea-going personnel were aware of the issue and of the consequences of breaking environmental rules. The evidence showed that managers kept a close eye on the activities of their sea-based staff to ensure continuity in the operation of company environmental compliance programmes on board the ship and to drive best practice. Ship staff too adhered to the company's policy partly because they were afraid of facing disciplinary sanctions for breaching company procedures or of getting both themselves and the company implicated by regulatory enforcement authorities in any acts of infringement.

It is very clear from the research findings that strategies to address pollution prevention and its regulation at sea have been embraced by both the company and front-line staff who have ultimate responsibility for implementing company environmental programmes aboard the ship. The results show company strategies in this regulatory area to appeal better to both seafarers and managers when compared with levels of management commitment in the implementation of similar statutory requirements such as those regulating health and safety at sea (see also Sampson 2011). The discussion in chapter eight demonstrated that it was clear to both managers and seafarers that environmental compliance was a key priority at the company. Seafarers on their part did not generally view complying with written procedures for environmental protection as constraining or undermining their skills as sailors to the extent that they do in relation to health and safety procedures (see, for example, Bhattacharya 2009; see also Xue 2012).

The absence of differences in compliance practices on board the two case study ships further emphasizes these shared perceptions. During detailed discussions with seafarers and throughout my stay on board, I found that the environmental practices were consistent on both ships. While this study found that there were no significant differences in the way ship staff interpreted and applied environmental requirements and company procedures in relation to this, it nevertheless suggests that the impact of environmental compliance can be experienced by seafarers differently because of a ship's particular characteristics, its trading route and the ensuing regulatory implications. The analysis in chapters five, six and seven highlighted instances where ship differences had produced different experiences of the impact of environmental compliance. For example, in relation to air pollution regulations (see section 6.2), whereas the *Belle Mers* was trading continuously in a non-restricted area[62], a significant stretch of the *Fair Winds'* route was within a Sulphur Emission Control Area (SECA). Crew on the latter ship had the additional burden of ensuring that the ship was in compliance with the applicable sulphur limit and were fatigued as a result.

More broadly, these findings parallel Hodson's (1991) observation that labour conflict is not necessarily determined by capitalist social structure but rather that workers can be motivated to organize resistance at the same time that they are complying fully (see also Knights and McCabe 2000). While shipboard workers, who are seemingly powerless in

[62] The *Belle Mers* did not have an established trading pattern and occasionally entered an emission control area (United States). However, during my stay on board the ship, the route was continuously outside the restricted area.

the face of management control in relation to environmental compliance, are not motivated by the constraining changes in their work associated with this development to initiate resistance and change in the labour process, these workers nevertheless are able to achieve resistance and change in the organizing process mostly through labour conflict between co-workers rather than against managers (see also Hodson 1991). For example, this is evident in the exasperation amongst ship staff responsible for sorting the ship's aggregate garbage when faced with poorly segregated waste receptacles by recalcitrant colleagues. This recalcitrance from shipboard colleagues can also be seen as an attempt by co-workers to "carve out spaces for influence and control" (Murphy 1998, p. 500; see also Fleming 2003; Mumby 2005). Similar resistance can be observed in the way in which ship staff blamed accumulation of maintenance wastes in the engine room on their relatively inexperienced (and "cheaper") colleagues who were hired by the company; in their complaining; and in the general feeling of anxiety on board the ship. However, even though many can, not all seafarers are found to respond by finding "spaces" to avoid control in the process of environmental compliance (see also Knights and McCabe 2000).

A possible explanation as to why shipboard workers appear to be anesthetized in the face of what they perceived as constraining environmental policies is the fear of losing their job which is a means to their livelihood and that of their families (see also Sampson et al. 2013). Seafarers are also unlikely to demonstrate any strong reaction to their senior officers (captain, chief engineer and chief officer) who represent the company at the shipboard level partly because they perceive the constraining requirements to come from either the company or third parties (e.g. regulatory inspectors, contractors and business partners) rather than from line management on board the ship. In contrast, ship staff are more likely to pass on any reaction to the pressures that come with management control in relation to environmental compliance to their peers on board the ship because the risks of doing so are minimal.

Limitations

All research suffers from limitations and this piece of doctoral research is no exception. In this section, I identify the limitations of my thesis and justify the choices that were made in the research process. I also suggest how these weaknesses in the study could be overcome in the future.

The line of inquiry that was adopted for exploring the practice of compliance in the case study was based on MARPOL regulations and the Ballast Water Convention. It was also guided in part by the company's business requirements as prescribed in its environmental management system (EMS). Clearly, these requirements do not constitute an exhaustive representation of the current regulatory framework for pollution prevention in the maritime industry. However, restricting the analysis to MARPOL regulations, ballast water requirements and the company EMS allowed me to explore the perceptions of seafarers of different ranks consistently and equitably.

As described in chapter four, the company on which this case study is based can be viewed as an example of a company occupying a place at the better end of the full range of ship management companies, particularly in terms of its reputation for environmental responsibility. The company's core business is more substantially located in the tanker trade – a sector where adherence to environmental standards is further dictated by customer requirements and market competition (see Walters and James 2009). In addition, the company had pursued ISO (International Organization for Standardization) certification of its EMS, yet another criterion which makes it a potentially "green" company. All of this was not unforeseen or an unexpected occurrence. As pointed out in the methodology, the study was clearly intended to explore the practice using the case of a relatively compliant company. It was not however intended to locate a representative case of the shipping industry but rather, a company that would provide something similar[63] to a "critical case" of the impact of environmental compliance on workers (see also Goldthorpe et al. 1968) – that is, if ship staff had not been affected at this particular company, then it was unlikely that they had been affected at other shipping companies For this reason, the results of this study may not reflect the full situation of shipping companies that are not complying with environmental regulations. Thus, this research acknowledges that the example case study is not necessarily typical of all ship management companies or indeed of companies operating purely in the container sector. In doing so, it recognizes that ship owners are complying to varying degrees and that environmental practices may differ from company to company. Inevitably, this will produce differential impacts for the working conditions and wellbeing of seafarers on board.

[63] Perhaps the best example of a "critical case" in the shipping industry is located in the tanker sector where the enforcement of environmental compliance is tightest. Therefore, a company operating purely in the tanker sector would provide the real critical case.

This research similarly recognizes the shortcoming of investigating the practice at only one ship management company. Getting a single company and its staff to cooperate in a case study is far more demanding than having them agree to a one-off interview or to complete a questionnaire. As is the experience of most researchers, the biggest problem I faced was persuading busy ship managers not only to engage in an hour-long interview but also to get them commit to provide supporting information – that is authorizing access to company records and granting permission to visit its ships. The case study emerged only after a very long time of courting the company and this made it difficult to pursue the investigation at more companies.

Taking the above limitation further, the single case study approach contributed to uneven data in the research for those environmental protection-related activities that were undertaken by only a few individuals on board the ship. Had I been able to interview more seafarers, I might well have uncovered further examples of the ways in which work at sea has been affected by environmental compliance. Although the problem could have been addressed by extending the fieldwork on more ships (or more companies), resource limitations made this impossible.

The total sea time spent doing fieldwork aboard the company's ships was 29 days or two-week voyages on each ship. Whereas this produced sufficient data for understanding the practice of complying with environmental regulations on board the ship (and for experiencing it too), spending more time on the ships could have generated more insight into how seafarers are affected by environmental compliance. This would have been an opportunity to for me to conduct more shipboard observations (e.g. problems with sewage disposal in Turkey) and especially, to allow some reluctant and tongue-tied crew members (and perhaps those who still perceived me to be the "owners special guest") to open up more during the interviews. However, organizational factors such as visa requirements for leaving the ship and related logistical challenges made it impossible for me to stay longer in the research setting.

The vessels researched in this single case study were container ships. Obviously, they by no means represent the whole spectrum of environmental concerns from the operation of ocean-going merchant ships. The operation of environmental programmes on board ships could be more complex than described in this study when one considers the significance of additional environmental impacts from other ship types, such as tankers and bulk carriers. Nonetheless, the environmental programmes investigated in the case of

container ships are relevant for most ship types and are intended to give a sense of what the practice of complying with pollution prevention requirements on a merchant ship is and of the possible impacts upon worker roles and wellbeing.

Overall, the findings from this study have contributed significantly to the understanding of the practice and impact upon workers of compliance with environmental regulations in a globalized industry. However, it is probable that the circumstances in other companies and the situation on board different ship types could raise additional consequences underlying the practice which have not been addressed by this study. It may have been useful to look at more than one company or different ship types but notwithstanding these and other limitations discussed in this section, the study has presented us with a valuable insight into the perceptions of workers with regard to the risks associated with environmental compliance and furthermore the ways in which they, and their managers, may be underestimating the potential for harm.

The Research Process

Apart from the above research limitations, there were also a number of lessons I learnt about doing research in general and about myself as a researcher in the process of undertaking this piece of doctoral research. Similar lessons, including my experience as a first-time interviewer; the drawbacks of strict adherence to research protocols; and the significance of my research relationships, have been discussed in chapters two and three of this thesis. However, what I will cover here is more about how I dealt with participant confidentiality in writing up the research and what I learnt about myself from transcribing the interviews.

The primary challenge for me as a researcher had to do with adhering to research ethics and remaining true to my commitment of participant confidentiality and especially, considering that I was reporting on a single company. Data on corporate compliance with environmental requirements is in many cases legally and commercially sensitive. Although I had agreed to keep the identities of the cooperating company and individual participants confidential, I found anonymizing the interview data tricky on several levels. In particular, I was concerned about the small numbers (and a single female participant) as it would

become obvious to readers[64], who I interviewed at the office or on the ship. To address this, pseudonyms were used and the ranks and positions of participants were condensed to further protect their anonymity. Pseudonyms did not necessarily match participants' gender and this was achieved by using a selection of made-up surnames and male forenames. For example, throughout the text, quotes are assigned with identifiers which consist of a pseudonym followed by the condensed rank or position in square brackets (e.g. *Tung, [Onshore Personnel 5]*). However, for shipboard participants, ranks and positions were not always condensed in diary extracts (with a few exceptions) because I felt that the quotes would end up being out of context. However, this did not compromise anonymity because there was a greater number of shipboard participants and with the same rank. In addition, the ship and company names have been changed for participant confidentiality.

The obligation to return participating managers' transcripts to them[65] made transcribing my research interviews a rather challenging exercise as I tried to be as accurate as possible. Interviews were transcribed verbatim and including pauses and hesitations so I could tell what respondents were trying to convey beyond the actual text. However, I was concerned about how participants would feel about having to read their own speech: the level of precision; the sorts of thing they might pick on or want to clarify or change; and especially the numerous pauses and hesitations (particularly if anyone of them naturally stammered). So on e-mailing the transcripts, I asked them to ignore these. Most participants usually got back to me saying their transcripts were ok and that they were happy for me to use it. There was however two instances where interviewees said they had found it difficult to read:

> *Good afternoon Ngwatung*
>
> *I have tried to read but it is literally a translation with every "um" & "er" included.*
>
> *It appears OK but would like to read when it is anonymised as it is difficult in present format.*
>
> *Regards (Harry [Onshore Personnel 1])*

[64] I had agreed on the terms of research access to make available a copy of the thesis to the company once this had been examined.
[65] This had also been agreed on with the company as part of the terms for research access.

Good afternoon Ngwatung,

The transcript is fine (although I didn't realize I said 'um' or 'er' so often), I'm happy for you to anonymise it and use it as part of your research.

Best regards, (Jimmy [Onshore Personnel 3])

Although I understood that this might have been a result of the verbatim content and pauses and hesitations, I felt I would be compromising the data for "reader-friendliness" by editing in a journalism style. In subsequent interviews, I "warned" participants in advance to expect this in their transcripts.

Being a non-native speaker of English, I found transcribing even harder. I had to listen out for words which I was unable to catch over and over again. After several attempts, and thanks to Google's search engine, I was often able to guess what the "mystery word" was. Some examples I encountered difficulty with are colloquial expressions in English such as: touch wood, cloud-cuckoo-land, etc. There were also unfamiliar place names, especially places where participants said they were originally from; technical names or symbols; and suppliers' names (e.g. paint manufacturers like *Jotun*, *AkzoNobel*, *Hempel*, etc.). In addition, I could have conveniently ignored place names for participants' origin as these were irrelevant for my study. But because of the obligation to return transcripts, I did not want to offend anyone. I felt that getting it wrong where someone came from could be as embarrassing as forgetting their name.

Still there were great benefits to transcribing. For example, I was able to think through as I typed along and look up technical jargon or things I was not familiar with. Occasionally, when doing this, I stumbled on some literature or diagrams explaining how particular equipment worked or some updates on a regulatory requirement. Transcribing helped me recollect what had taken place during my fieldwork (Bogdan 1972, p.43), especially things I had already forgotten or missed out. It also enabled me to include new or similar examples of whatever was relevant. In this way, I could conveniently update my research diary and field notes with cross references to the interviews (Sanjek 2001). Again, I could think about how and why I asked a particular question and the effect it had produced or the quality of responses I got. Although this meant that I had to transcribe more slowly – thinking and analysing the data mentally – it was worth it and paid off as I ended up producing both notes ("memos") and the transcript itself.

Future Research Direction

This research has sought to explore how shipping companies have responded to global environmental regulation and how their response has impacted on seafarers. In developing and completing this research, both of these goals were achieved. Nevertheless, I would argue that further work is desirable.

This exploratory study contributes to the understanding of the practice and impact on workers of environmental compliance within shipping companies and in particular on board container ships. In order to increase the generalizability of this work, it is necessary to study more empirical cases in the shipping industry and across different shipping sectors.

Only a few studies, including this one, have addressed environmental compliance practices in the large, multinational and forward-looking company context. More research is needed to better understand the impact upon worker roles and wellbeing of environmental compliance strategies in different business contexts, such as for the average ship owner operating only a few ships or for those ships flying underperforming flags. In addition, the general idea of implementing strategic programmes for environmental compliance is still new to most shipping companies. However, as sustainability becomes more salient among key business decisions in shipping, corporate compliance strategies are expected to change rapidly. In this regard, future research based on longitudinal perspectives could assist in understanding the changes in the work experience on board ships over time.

A final issue worthy of further exploration which this study highlights is that ship staff did not report any significant health problems in relation to their fulfilment of pollution prevention tasks on board the ship. The health effects from some exposures (such as pulmonary diseases, skin problems, fatigue, cancer, gastrointestinal and cardiovascular disorders) which have been well studied among other waste workers in land-based sectors have also been previously identified among sea-going populations, such as by studies that have evaluated mortality and morbidity patterns in seafarers (Roberts 2005; Roberts and Marlow 2005; Wadsworth et al. 2008; Roberts and Jaremin 2010) and among navy submariners (Thomas et al. 2003). The present research was not intended to establish causality between environmental protection and seafarers' occupational ill-health but on the other hand, a job-specific epidemiological assessment of these known work-related

health effects among sea-based workers may yield a more accurate appreciation of how damaging the fulfilment of environmental protection-related work at sea might be.

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APPENDIX 1: INTERVIEW GUIDE FOR SHIP MANAGERS

1. Your role and length of time with company

2. What environmental regimes are your company subjected to (Marpol [annexes], ISM code, EU legislation, local/national laws)?
- What are its key features (Garbage; Sewage; Oil; Air Pollution/Emissions; Paints/Antifouling Systems; Hazardous wastes; Scrapping/Recycle; Repair Works/Dry-dock [shore leave/use of galley/toilets]; Ballast Water; Hospital/Medical wastes; Other)?
- How do you comply with its provisions within the company?
- And aboard your company's fleet?
- Across the supply chain?
- Does the company play any role in this?
- What/who does it involve (policy [communication]; EMS; Equipment/Training, etc.); [If no – why not]?
- Do crew members have a part to play?
- Who/what does it involve?

3. Has implementing these environmental programmes had any unintended consequences for workers aboard company's ships (more work; demanding/ time-consuming; sickness/injuries; occupational hazards; toxic chemicals; stressed/demoralized/morale; detained; retention)?
- Examples.
- How/why did it happen?
- What effect did it have on the company and on crew/workers in general (morale/productivity)?

4. Have there been any changes in company's environmental programmes (last 5 years)?
- What aspects were involved?
- How significant was it/ what impact has it had on work/workers in the company as a whole?
- What impact on workers aboard company's ships?

5. Challenges of environmental compliance (for company/for workers/for crew members).

6. Final remarks.

7. THANK YOU

APPENDIX 2: INTERVIEW GUIDE FOR SEAFARERS

1. Your role on board this ship and time with company?

2. What does your work on board this ship involve (what do you do)?

3. Are there very strict rules in shipping about the environment (Garbage; Sewage; Oil; Air Pollution; Paints; Hazardous wastes; Repair works, etc.)?

4. Does your company have any policy/rules/guidelines/protocols about the environment [what does it say; access; communication]?

5. In doing your work what are some of the things the company requires you to do about the environment:

(a) what are company rules about the following; and (b) how do you do/manage these aboard the ship:
- Garbage
- Sewage
- Oil (sludge + bilges)
- Chemicals
- Air pollution/Emissions
- Ballast water
- Anti-fouling paint
- Removal/disposal of hazardous wastes (oily rags/batteries/hospital/pyrotechnics)
- Repair works (spraying, breaking, other repair works)

6. How has going about your work in this way changed the way you work?
- Do you feel that you now do more/less work?
- Do you now spend more time at work than before?
- Do you find your work more demanding than before?
- Do you find it easy to adapt/adjust to this new way of doing
- Do you feel exposed to any health or physical hazards at work as a result of this new way of doing work?
- What else has changed in your work?[66]

[66] Questions under sections 6 and 7 of the interview guide were asked in conjunction with the questions under section 5, and where these were relevant for the position being interviewed.

7. What do you think about your company's rules on the environment?
- Garbage (sorting and/or being sorted)
- Sewage
- Oil (sludge + bilges)
- Air pollution/Emissions
- Ballast water
- Anti-fouling paint
- Removal/disposal of hazardous wastes (oily rags/batteries/hospital/pyrotechnics)
- Repair works (spraying, breaking, other repair works)

a. Is it feasible/ Does it really work?
b. Why/why not?
c. Is it clear and easy to understand and follow?
d. Do you receive any form of training or support to apply these rules in your work (ship differences and re-learning to use)?
e. Do you feel that environmental rules are important at all (why/why not; for whom)?

8. Final remarks.

9. THANK YOU

APPENDIX 3: SPECIMEN ACCESS LETTER TO COMPANIES

Friday, 27 August 2010

[Contact Name DELETED]
[Position DELETED]
[Company Name DELETED]
[Address DELETED]

Dear [Contact Name DELETED],

Research Access for PhD Student

I am a postgraduate researcher based at the Seafarers International Research Centre (SIRC) in the Cardiff University School of Social Sciences, Wales, UK.

I am investigating the topic "**Global Environmental Standards and Workers in the Shipping Industry**" as a requirement for a PhD degree. The overall aim of this research is to contribute to sociological understanding of how environmental regulation affects workers. It focuses on the practices of shipping companies in complying with environmental standards and how these might affect seafarers in particular. This would involve conducting interviews with (a) shipping company personnel; and (b) with seafarers aboard ships.

I am therefore exploring the possibility of carrying out this study under the auspices of your organization.

On the shipboard side, I would need to interview between 10-15 seafarers per ship during a voyage aboard two of your company's ships. In respect of this, I am open to joining the ships from any of the ports they visit and as per your company's convenience. I will be responsible for all associated costs.

I would be grateful for an opportunity to discuss the research further with you and to answer any questions.

Please find enclosed the following supporting documents:
1. Short summary of the project (proposal);
2. Participant information sheet (company);
3. Resumé; and
4. Cardiff University ethics approval for this project.

I look forward to this opportunity of working with you.

Yours sincerely,

Mr. Ngwatung Akamangwa
Seafarers International Research Centre
Cardiff University School of Social Sciences
52 Park Place, Cardiff CF10 3AT, Wales, UK
E-mail: AkamangwaN@cardiff.ac.uk

APPENDIX 4: COMPANY RESPONSES TO REQUEST FOR ACCESS

Companies contacted for the Main Study (Aug 2010-Feb 2011)				
Number of companies	Location	Responded	Access	Reasons
05	UK	05	02	No berth; Need owners approval
02	Other Europe	02	-	-
02	North America	-	-	-
01	Asia	01	-	-
Companies contacted for the Pilot (Dec 2009-June 2010)				
01	Asia	01	01	Onshore only
03	Africa	02	02	-
04	Europe	01	-	Spot market and training ships only

APPENDIX 5: PROFILE OF RESEARCH PARTICIPANTS AND SHIPS

Onshore Personnel		
Number of Participants	**Department/Position**	
07	***Total***	
	Position Interviewed	*Department*
02		Technical/Fleet
05		Loss Prevention, Safety and Quality
02	Managers	
03	Superintendents	
02	Other	

Seafarers			
Number of Interviewees	**Department/Nationality/Rank**	**Fair Winds**	**Belle Mers**
34	***Total***	***19***	***15***
10	Officers	6	4
17	Ratings	9	8
7	Trainee	4	3
22	Deck	13	9
12	Engine	6	6
3	British	2	1
6	Eastern European	5	1
25	Filipino	12	13

Ships		
Ship Characteristics	**Fair Winds**	**Belle Mers**
Ship type	Dry cargo (box)	Dry cargo (box)
Age (years)	10	15
Flag	UK	Singapore[67]
Capacity (TEUs)	2000-3000	1000-2000
Class	IACS member	IACS member
Owner	Usk Shipping	Usk Shipping
Manager	Taf Shipmanagement	Taf Shipmanagement
Operator[68]	Bute Liner	Crwys Liner
Crew size	22	21
Deck	14	13
Engine	8	8
Trainee	5	4
Nationalities	Filipino, Eastern European and British	Filipino, Eastern European and British
Trade	Liner	Liner/Tramp
Region	North West Europe and Mediterranean	US, Central & South America and the Caribbean

[67] Vessel had very recently changed flags from UK to Singapore.
[68] Both operators were in the top ten container operators/carriers.

APPENDIX 6: ACCEPTANCE LETTER FOR RESEARCH ACCESS

Ngwatung Akamangwa
Seafarers International Research Centre
Cardiff University
52 Park Place
CF10 3AT

[Date DELETED]

Taf Shipmanagement Ltd.
[Address DELETED]

TO WHOM IT MAY CONCERN

Statement of Acceptance – Research Access for Mr Ngwatung Akamangwa

I the undersigned, *Ngwatung Akamangwa*, wish to confirm that the above access is being secured solely for the purpose of investigating the research topic "Global Environmental Standards and Workers in the Shipping Industry".

This research project is purely an academic exercise and shall be carried out as such and in strict observation of participant confidentiality, Cardiff University ethical guidelines and the Data Protection Act whereof the following shall apply:

1. *Usk Shipping Ltd*, *Taf Ships* or its affiliates will not be identified in any way whatsoever at any stage of the research or in its write-up;
2. *Taf Shipmanagement* office staff will be offered copies of their own interview transcripts and will be allowed to clarify any misunderstandings or misconceptions; and
3. This is a thesis for University examination and a copy of the final report will be offered *Taf Shipmanagement* once it has been examined.

Please refer to the enclosed Cardiff University ethics approval for your records.

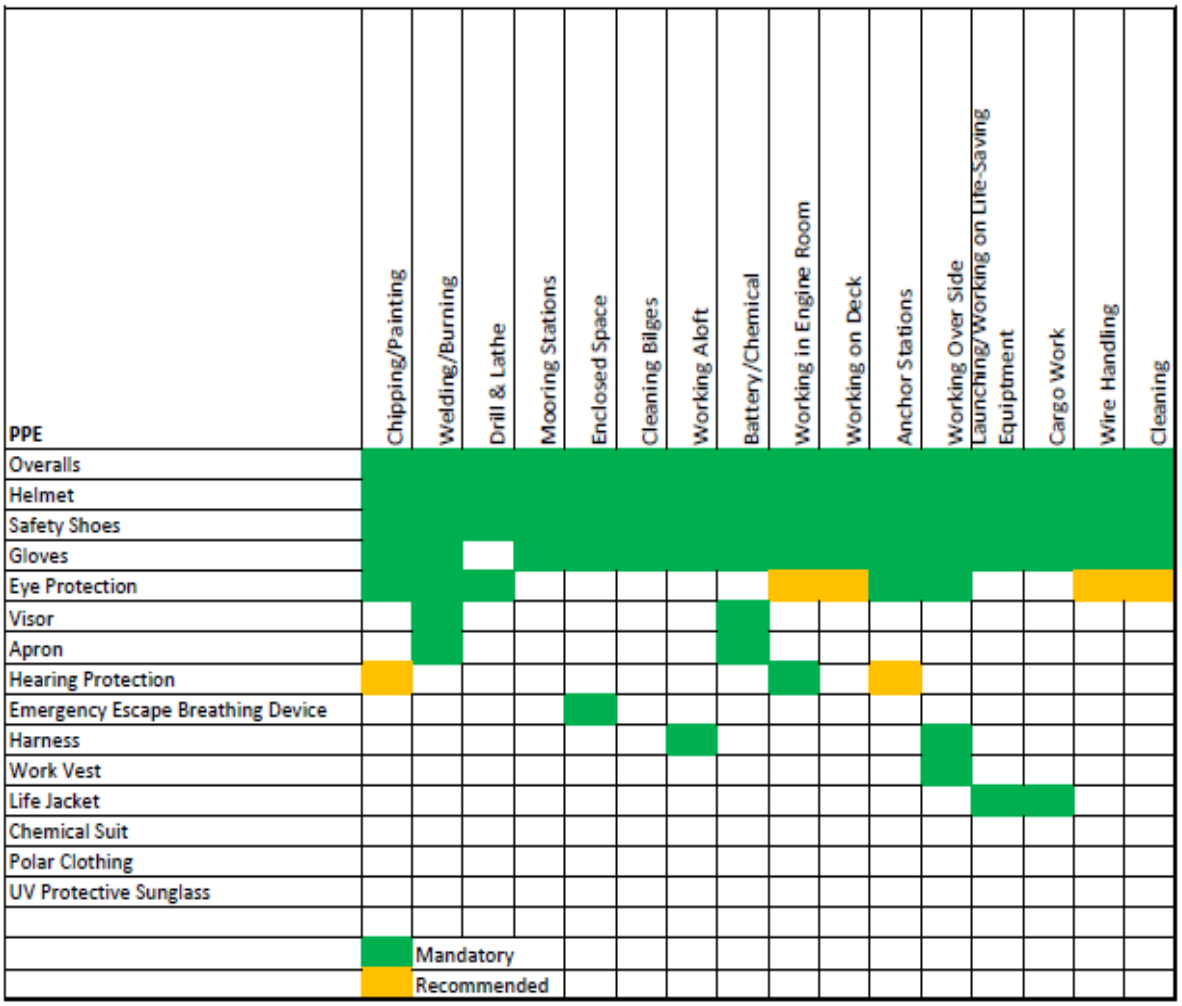
Thanking you for your time and kind assistance.

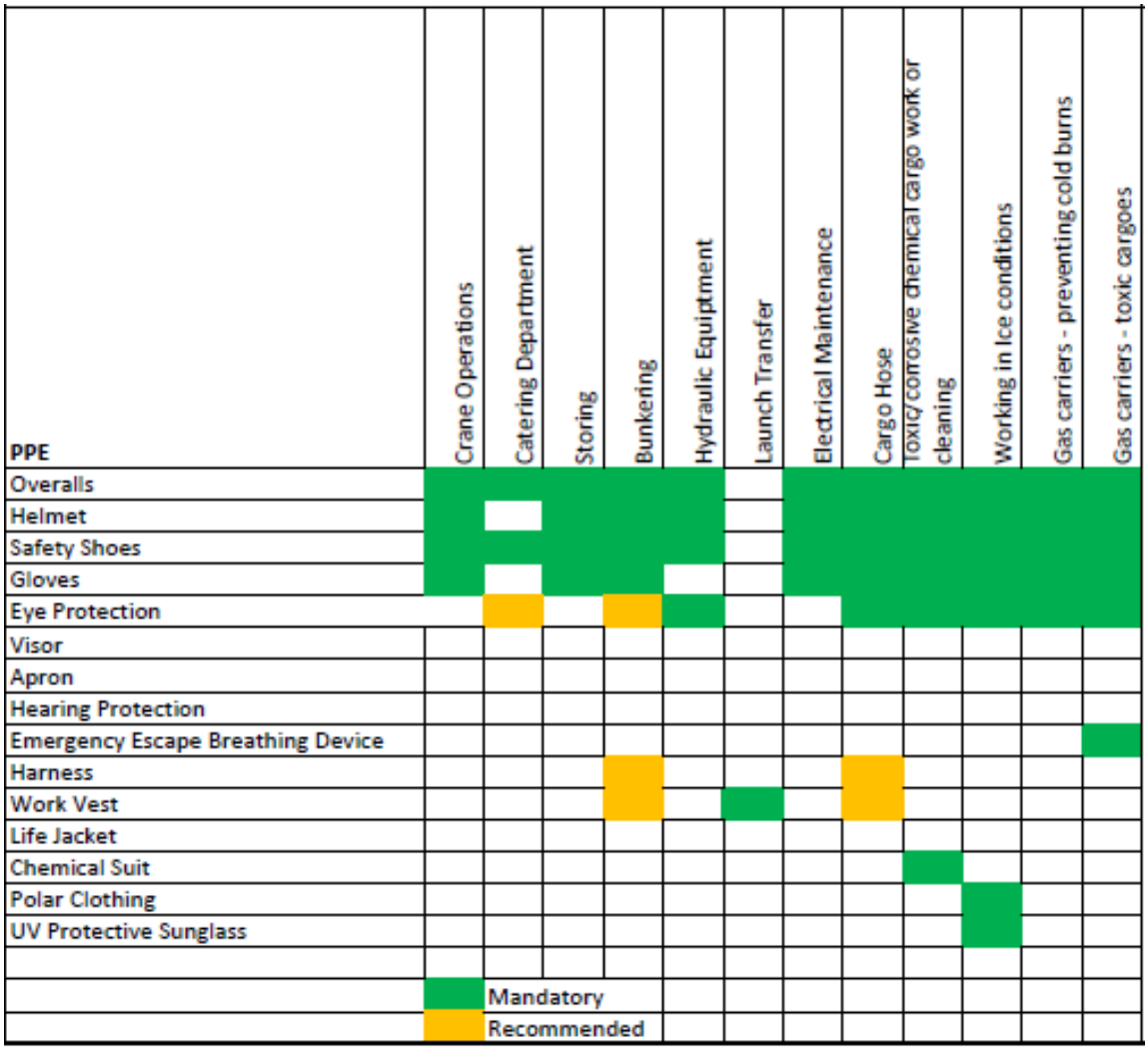
Yours faithfully,

Ngwatung Akamangwa
Postgraduate Researcher

Enc.: (01) Ethics Approval

APPENDIX 7: COMPANY PPE MATRIX




PPE
Crane Operations
Catering Department
Storing
Bunkering
Hydraulic Equiptment
Launch Transfer
Electrical Maintenance
Cargo Hose
Toxic/corrosive chemical cargo work or cleaning
Working in Ice conditions
Gas carriers - preventing cold burns
Gas carriers - toxic cargoes
Overalls
Helmet
Safety Shoes
Gloves
Eye Protection
Visor
Apron
Hearing Protection
Emergency Escape Breathing Device
Harness
Work Vest
Life Jacket
Chemical Suit
Polar Clothing
UV Protective Sunglass
Mandatory
Recommended

APPENDIX 8: ETHICS APPROVAL

Cardiff School of Social Sciences
Director Professor Malcolm Williams
Ysgol Gwyddorau Cymdeithasol Caerdydd
Cyfarwyddwr Yr Athro Malcolm Williams

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

Cardiff University
Glamorgan Building
King Edward VII Avenue
Cardiff CF10 3WT
Wales UK
Tel *Ffôn* +44(0)29 2087 5179
Fax *Ffacs* +44(0)29 2087 4175
www.cardiff.ac.uk/
Prifysgol Caerdydd
Adeilad Morgannwg
Rhodfa Brenin Edward VII
Caerdydd CF10 3WT
Cymru Y Deyrnas Gyfunol

9th April 2010

Our ref: SREC/595

Ngwatung Akamangwa
MPhil/PhD Programme
SOCSI (SIRC)

Dear Ngwatung

Your project entitled "*Global Environmental Standards and Workers in the Shipping Industry*" has now been approved by the School of Social Sciences Research Ethics Committee of Cardiff University following its meeting on 3rd March 2010 and you can now commence the project.

Please note that since your project involves data collection abroad you may need approval from a competent body in the relevant jurisdiction.

If you make any substantial changes with ethical implications to the project as it progresses you need to inform the SREC about the nature of these changes. Such changes could be: 1) changes in the type of participants recruited (e.g. inclusion of a group of potentially vulnerable participants), 2) changes to questionnaires, interview guides etc. (e.g. including new questions on sensitive issues), 3) changes to the way data are handled (e.g. sharing of non-anonymised data with other researchers).

All ongoing projects will be monitored every 12 months and it is a condition of continued approval that you complete the monitoring form.

Please inform the SREC when the project has ended. Please use the SREC's project reference number above in any future correspondence.

Yours sincerely

Professor Tom Horlick-Jones
Chair of the School of Social Sciences Research Ethics Committee

cc: E Renton
Supervisors: H Sampson
D Walters

APPENDIX 9: HEALTH AND SAFETY QUESTIONNAIRE

Field Trip Health and Safety Questionnaire Name:

Please fill out this form honestly and talk to your supervisors about how you will manage any risks which may result from your health condition. The questionnaire will be treated as strictly confidential and having a medical problem does NOT exclude you automatically from the fieldwork

Do you currently or have you suffered with the following:

HEART AND CIRCULATORY DISORDERS	YES	NO
Heart attack		
Angina		
Murmurs		
Reynauds Disease		
Either high or low blood pressure		

BLOOD DISORDERS		
Anaemia		
Sicklecell Anaemia		
Haemophilia		

MEDICAL CONDITIONS	YES	NO		YES	NO
Asthma			Crohns Disease		
Hay Fever			Ulcerative colitis		
Diabetes			Skin conditions - specify		
Epilepsy			Vertigo		

PSYCHIATRIC CONDITIONS					
Depression			Nervous debility		
Other					

REGISTERED/UNREGISTERED DISABILITY					
Visually impaired			Ambulatory impairment		
Hearing impairment			Other		
Back / neck pain / condition			Hernia		
Arm or leg / foot injury			Are you in good health?		
Arthritis or joint problems			Can you swim at least 50 meters?		
Do you have specific dietary requirements?					
Are you currently taking medication? - If yes, please specify					
Do you have any allergies? If yes, do you carry medication?					
Have you checked that your vaccination status is appropriate?					
Have you had a tetanus vaccination during the last 10 years?					
Is there anything you can think of which may impact/restrict the activities and objectives of the field trip as explained to you?					

Attendee signature:_____

Supervisor/ Date_____

line manager:_____

Department:_____

APPENDIX 10: SHIPBOARD CONTACT FORM

STUDENTS UNDERTAKING FIELDWORK ABOARD SHIPS

Name: NGWATUNG AKAMANGWA
UK mobile no.:
Satellite tel. no.:
Other tel. no.:

Contact person[1] (who will contact your supervisor/SIRC Director if you fail to make contact at least every 2 days)
Name:
Address:
Telephone no:
Mobile no:
E-mail:

Ship's contact details
Name of the ship:
Call Sign:
IMO number:
Name of the captain:
Phone no. on the ship:
E-mail address on the ship:
Port of departure:
Port of arrival:
Date & time of departure:
Date & time of arrival:

Owner/Company's contact details
Name of the company:
Company's contact person:
Position of the contact person:
Tel. no(s) of the above person:
E-mail address of the above person:

Supervisor's contact details
Name:
Tel. no.:
E-mail:

SIRC Director's contact details
Name:
Tel. no.:
E-mail:

Person (2) to be contacted in emergency – if different to Contact Person[1] **please complete:**
Name:
Address:
Tel. no.:
Mobile no.:
E-mail:

Please print out the completed form and provide copies to:
Contact person[1] ☐
Supervisor(s) ☐
SIRC Director ☐
SIRC Office ☐
Person 2 ☐

[1] The named individual whom the research student is **obliged** to contact (by e-mail, text message, phone, etc.) **at least every two days** whilst undertaking a voyage.

APPENDIX 11: FIELDWORK RISK ASSESSMENT

RISK ASSESSMENT FORM[1]

Name:

Student number:

Date of Proposed Research Trip:

A. **RISKS IDENTIFIED**

(e.g.: General Risks, Research Specific Risks, health and safety questionnaire etc.)

B. **FACTORS CAUSING RISKS** (e.g.: own identity, sensitive nature of research etc.)

C. **ACTIONS TAKEN / TO BE TAKEN TO MINIMISE RISK**[2] (e.g.: Hire of sat. phone if undertaking fieldwork **onboard ship** etc.)

[1] Please complete this form with the assistance of your supervisors.

[2] NB All students who want to undertake **fieldwork onboard ship** are **obliged** to hire and carry a mobile satellite phone to allow them a means of independent contact with SIRC (or their named contact person) whilst on board. This requirement is essential and NOT negotiable and involves significant cost to the student which should be considered before any decision is made to undertake on-board fieldwork.

Students are responsible for hiring satellite phones themselves. Satellite phones can be hired from G Comm, http://www.g-comm.co.uk/, Tel.:01493 669966, Fax: 01493 669977. In most cases a deposit must be paid to the rental company and some students may find this difficult as it can be for a significant amount. Should fellows require SIRC assistance with this matter they should talk with the office who will supply them with the information and paperwork they require. Please note that SIRC will require students to reimburse the Centre for **any** costs entailed in relation to the loss or use of the phone, should SIRC provide any assistance with its hire.

APPENDIX 12: INFORMATION SHEET FOR COMPANIES

Research Project: Global Environmental Standards and Workers in the Shipping Industry

Dear Prospective Participant,

You are being invited to take part in the above research study. To help you decide whether or not you would want to participate it is important that you fully understand why the research is being carried out and what it will involve. Please read through the following information carefully and feel free to talk about it with other people if you find it necessary to do so.

What is this study about?

The overall aim of this research is to contribute to sociological understanding of how environmental regulation affects workers. It focuses on the practices of shipping companies in complying with environmental standards and how these might affect seafarers in particular.

Who is doing the study?

This research is being carried out by Mr. Ngwatung Akamangwa. Ngwatung is a postgraduate research student based at Cardiff University in the School of Social Sciences. Ngwatung is being supervised by Professors Helen Sampson and David Walters of the School of Social Sciences.

Why have I been chosen?

The researcher is looking to speak to shipping company personnel because they plan and oversee ship operations.

What will I have to do?

You will be invited to take part in an interview which will last between one (01) and two (02) hours. With your permission this interview would be recorded on an audio recorder to help the researcher remember all the things that are said in the conversation.

What kinds of topics will be discussed?

During the conversation you will be asked to talk about your company's strategy and procedures for managing the environment at the shipboard level. You can choose to say as much or as little as you want and you can choose not to talk at all. You are also free to withdraw from the conversation at anytime and without giving any reason. All you need to do is let the researcher know.

What will be done with the information I give?

At the end of the interview the researcher will play back the audio recording of the conversation to write out the full conversation exactly as it took place. This written text of the interview will then be analysed and used to write up the final report known as a thesis. It will also appear in other publications such as books and journals. It will not be used for any other purposes by the researcher.

Will the information I give be kept confidential?

In writing out the text of the conversation the researcher will ensure that all personal information given by you including ship and company details is removed. This nondescript version of the conversation will only be accessible to the researcher and supervisors. Both the audio and written files of the conversation will not be labeled with your name. They will be stored in a secure location at Cardiff University.

What if I am concerned about the conduct of the research?

This research is being conducted with Cardiff University School of Social Sciences Research Ethics Committee approval. If you are unhappy about the general conduct of the research or indeed about anything relating to how this study was carried out please contact the Chair of the School Research Ethics Committee using the following address:

Cardiff University School of Social Sciences
Glamorgan Building
King Edward VII Avenue
Cardiff CF10 3WT
Wales, UK

How can I contact you?

If you would like to take part in this study or would like further information about this research please contact the researcher using the address below. Thank you for taking time off to read this and it would be a pleasure to have you participate.

Mr. Ngwatung Akamangwa
Seafarers International Research Centre
School of Social Sciences
Cardiff University
52 Park Place
Cardiff CF10 3AT
Wales, UK
E-mail: AkamangwaN@cardiff.ac.uk

Distribution:

- 01 copy participant [Ref. PIS10……]
- 01 copy research file

APPENDIX 13: INFORMATION SHEET FOR SEAFARERS

Research Project: Global Environmental Standards and Workers in the Shipping Industry

Dear Prospective Participant,

You are being invited to take part in the above research study. To help you decide whether or not you would want to participate it is important that you fully understand why the research is being carried out and what it will involve. Please read through the following information carefully and feel free to talk about it with other people if you find it necessary to do so.

What is this study about?

The overall aim of this research is to contribute to sociological understanding of how global regulation affects workers. It focuses on the practices of shipping companies in complying with environmental standards and how these might affect seafarers in particular.

Who is doing the study?

This research is being carried out by Mr. Ngwatung Akamangwa. Ngwatung is a postgraduate research student based at Cardiff University in the School of Social Sciences. Ngwatung is being supervised by Professors Helen Sampson and David Walters of the School of Social Sciences.

Why have I been chosen?

The researcher is looking to speak to seafarers with experience of working aboard ocean-going merchant ships because they are directly responsible for carrying out company environmental programmes aboard the ship.

What will I have to do?

You will be invited to take part in an interview which will last between one (01) and two (02) hours. With your permission this interview would be recorded on an audio recorder to help the researcher remember all the things that are said in the conversation.

What kinds of topics will be discussed?

During the conversation you will be asked to talk about your experience of environmental management aboard the ship; and how you feel managing the environment affect your work and life aboard the ship. You can choose to say as much or as little as you want and you can choose not to talk at all. You are also free to withdraw from the conversation at anytime and without giving any reason. All you need to do is let the researcher know.

What will be done with the information I give?

At the end of the interview the researcher will play back the audio recording of the conversation to write out the full conversation exactly as it took place. This written text of the interview will then be analysed and used to write up the final report known as a thesis. It will also appear in other publications such as books and journals. It will not be used for any other purposes by the researcher.

Will the information I give be kept confidential?

In writing out the text of the conversation the researcher will ensure that all personal information given by you including ship and company details is removed. This nondescript version of the conversation will only be accessible to the researcher and supervisors. Both the audio and written files of the conversation will not be labeled with your name. They will be stored in a secure location at Cardiff University.

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Cardiff University School of Social Sciences
Glamorgan Building
King Edward VII Avenue
Cardiff CF10 3WT
Wales, UK

How can I contact you?

If you would like to take part in this study or would like further information about this research please contact the researcher using the address below. Thank you for taking time off to read this and it would be a pleasure to have you participate.

Mr. Ngwatung Akamangwa
Seafarers International Research Centre
School of Social Sciences
Cardiff University
52 Park Place
Cardiff CF10 3AT
Wales, UK
E-mail: AkamangwaN@cardiff.ac.uk

Distribution:

- 01 copy participant [Ref. PIS10……]
- 01 copy research file

APPENDIX 14: CONSENT FORM

Research Project: Global Environmental Standards and Workers in the Shipping Industry

Name of Researcher: **Ngwatung Akamangwa**		Please Initial
1.	I confirm that I have read and understood the information sheet [Ref. PIS10……..] for the above study. I have been allowed sufficient time to consider the information provided and to ask questions about the research.	
2.	I understand that my participation is voluntary and that I have the right to withdraw from the research at anytime and without giving any reason.	
3.	I also have the right to request that all personal information given by me be destroyed should I withdraw from the research.	
4.	I hereby agree to take part in the study.	

Name of Participant	Date	Signature
Name of Person taking consent	Date	Signature