

**AN ASSESSMENT OF THE LEVEL OF UNDERSTANDING REGARDING ISSUES OF
MARINE POLLUTION REGULATIONS IN RESPECT OF WASTE MANAGEMENT
(ANNEX V) IN THE PORT OF PORT ELIZABETH.**

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ABSTRACT

Background. Considering the experience of the Port of Port Elizabeth where waste volumes discharged from ships dropped drastically at the time when disposal tariffs had been increased due to a regional crisis, the question arises whether the waste that was supposed to be discharged in Port Elizabeth was instead dumped at sea.

Objective. The integrated waste management framework was used as a basis to evaluate the level of understanding of the requirements of the International Marine Pollution (Annex V) regulation and South African waste management legislation within key stakeholders (Government, port and ship personnel) that have a crucial role to play over ship to port waste stream. Considering that the individual's level of understanding is in tacit form, which could be difficult to measure, the investigation focussed on responses received and the application of that understanding as reflected by various intervention strategies, such as processes, procedures and practices put in place as means of complying with legislation. Both ship and port side practices were investigated to assess the effectiveness of the above-mentioned intervention strategies across all waste management functional areas as outlined in Figure 1. This included an assessment of the application of a waste management hierarchy in Figure 2, availability of an audit trail (record of waste management strategies implemented en route), clear allocation of responsibility, and capacity building so as to confirm or rule out the possibility of illegal dumping at sea, in light of the Port of Port Elizabeth's experience and also to form a good basis to make recommendations towards future improvements.

Sampling. A sample comprising 66.6% of the ships that called during daytime in the Port of Port Elizabeth, during the month of August 2003 were chosen randomly for interviews. Key role-players from the government and port were also interviewed as means of verifying facts around waste management practices from ship to port including legal enforcement issues.

Results. It seemed as though the shipside clearly understands legal requirements and there are indications that they attempt to adhere to those however, due to the lack of enforcement, they have adopted casual stance as reflected by waste logbooks that are incompletely filled and some outdated. There seems to be more chaos on the portside since government authorities that are supposed to enforce legislation including the directive they issued on galley waste management, have a fragmented as opposed to holistic approach whereby each department understands and sticks to it's scope, leaving gaps in between that if allowed to continue unaddressed could result in toothless legislation.

Conclusion. Due to the lack of visible legal enforcement, it is not possible to rule out the possibility of illegal dumping. The incompletely filled waste logbooks are the only reliable means of verifying that all waste generated on board the ship was indeed handled in a responsible manner and accounted for or not.

gebied sodat daar leemtes bestaan wat, indien daar voortgegaan word om dit nie aan te spreek nie, kan lei tot wetgewing wat byna niks beteken nie

Gevolgtrekking. Weens 'n gebrek aan die sigbare toepassing van die wet, is dit moontlik dat die onwettige storting van afval wel kan plaasvind. Die onvolledig voltooide afval-logboeke is die enigste betroubare bron vir verifikasie dat alle afval wat aan boord van die skip gegenereer was, wel op 'n verantwoordelike wyse gehanteer was en rekenskap daarvan gegee kon word.

ABBREVIATIONS

NPA	- National Ports Authority of South Africa
MARPOL	- Marine Pollution Regulations
IWMS	- Integrated Waste Management System
ISWMS	- Integrated Solid Waste Management System
ISWM	- integrated Solis Waste Management
IMO	- International Maritime Organisation
SA	- South Africa
PE	- Port Elizabeth
DoH	- Department of Health
DWAF	- Department of Water Affairs and Forestry
DEAT	- Department of Environmental Affairs
EPA	- Environmental Protection Agency
MEPC	- Marine Environment Protection Committee
EEZ	- Exclusive Economic Zones
NWMS	- National Waste Management Strategies

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CHAPTER ONE

1.1. Introduction

The National Ports Authority of South Africa (NPA) is entrusted with the task of ensuring effective and efficient management of the South African port system on behalf of the government. The following ports form part of the port system: Richards Bay, Durban, East London, Port Elizabeth (PE), Mossel Bay, Cape Town, Saldanha and the port currently under construction namely Port of Ngqura which lies between the ports of East London and Port Elizabeth (20 km east of Port Elizabeth). With the National Ports Authority corporate office situated in Braamfontein, all ports operate in a consistent manner on common matters and obviously differ in terms of managing issues that are unique to each port environment. The corporate office develops policies, strategies and oversees implementation of key initiatives at the ports that are regarded as business delivery platforms.

The vision of the NPA is to be a transformed, self-sufficient port authority that facilitates and enables competitiveness in a world-class port system, through facilitating economic growth by sustaining port infrastructure that is amongst the best in the world.

In light of the above, it is clear that the NPA perceives itself as a key player in the global village as a facilitator of trade, situated at the southern tip of the African continent. Considering the nature of port business and depending on where the destination of the cargo on board the ship is, the ship may call at any port of its choice. Some of the competing and determining factors are location of ports in relation to the cargo destination, turnaround time, efficiencies in cargo handling in ports, safety conditions (safety of life, vessel cargo and environment), costs in consideration of the entire supply chain, etc. (NPA Strategy: 2004).

On the other hand, ports host a variety of tenants involved in value adding activities that are associated with export and import business, hence their preference is to operate within the port boundaries. Tenants needs vary but include leasing infrastructure in the port and sometimes build a facility that is in accordance with specifications. With this kind of investment, risk management comes to the forefront as tenants would like to derive the expected return on investment made and therefore begin to be interested and concerned about safety, security and environmental sustainability of the port environment which can only be achieved when the entire port community improves their environmental practices, employee safety and physical

security. These requirements and concerns put more pressure on the Port Authority as a landlord in ports to ensure that tenants are not hindered but enabled in pursuing their business objectives.

Internationally, environmental sensitivity and responsibility plays an essential role towards becoming or remaining competitive in business. Like any other business, the port environment is regulated by a plethora of legislation i.e. international conventions and protocols as ratified by the South African (SA) government, national legislation, provincial ordinances and specific provincial legislation and local municipal by-laws depending on the location of each port. Important to note, is the International Maritime Organisation (IMO) that develops legislation that governs matters of international interest and issues directives to be implemented and adhered to by member states. Later on in this document, more mention will be made of various pieces of legislation that govern waste management

The IMO developed MARPOL73/78 regulations emanating from an International Convention on Prevention of Pollution from Ships of 1973 and as amended in 1978. The MARPOL regulations attempt to facilitate prevention or minimisation of impacts emanating from pollution from ships as reflected in MARPOL Annexes and regulations of which all ports are expected to comply with.

- Annex I : regulations for the prevention of pollution by oil
- Annex II : regulations for the control of pollution by Noxious Liquid substances in bulk
- Annex III : regulations for the prevention of pollution by harmful substances carried by sea in packaged forms or in freight containers, portable tanks or road and rail tank wagons
- Annex IV : regulations for the prevention of pollution by sewage from ships
- Annex V : regulations for prevention of pollution by garbage from ships.

The scope of this research focussed on the port of Port Elizabeth in respect of Annex V, which regulates the prevention of pollution from garbage from ships. The port of Port Elizabeth (PE) has been chosen because of the fact that it is small though it has the right mix of activities that determine the type of vessels that call there. The port handles containers, break bulk and pure bulk cargo, which are not that possible with some of the other ports considering that they sometimes have a strong inclination towards bulk

or containers and therefore not provide a balanced view of the activities. The general community of Port Elizabeth was exposed to a variety of waste management challenges and the port experienced regional and port challenges in the process of implementing integrated waste management.

During 2000 the Eastern Cape region suffered serious consequences of foot and mouth disease that affected the entire country and its neighbouring countries. When this happened, various possible options of origin of this epidemic were postulated. One of the possible sources was that the disease originated from garbage from ship/s that called at the Port of Durban. It was suspected that the waste contractor reused contaminated food waste to feed pigs in the farm thereby enhancing the epidemic and exacerbating the problem. This perception resulted in reclassification of ship garbage waste from general waste to become low hazardous waste.

The implications of the reclassification decision were that all the ports had to find low hazardous waste sites where this waste could be disposed. In the case of Port Elizabeth, no sites were available as the local hazardous landfill site (Aloes) was closed down due to environmental and design problems experienced during that period. This resulted in a ridiculous increase of waste disposal rates due to the fact that it became more expensive to transport and dispose of the ship galley waste to the nearest permitted landfill, as the PE region had only one general landfill site, i.e. Arlington site that is under the management of the municipality and one hazardous landfill site, i.e. Aloes Waste Site under the management of Enviro-Serve Waste Tech, which was non-operational at the time.

Above and beyond this, the re-classification directive from the Department of Water Affairs and Forestry (DWAF) and National Department of Health (DoH) also required that a clearly defined protocol on handling, storage, disposal and cleaning of waste collection equipment be adhered to. By implication, the role of the above-mentioned departments grew to include enforcing adherence to the new directive, which by its nature was an amendment or addendum to the existing waste management legislation. So, in order to facilitate safe handling of hazardous waste, Enviro-Serve Waste Tech provided an interim solution whereby hazardous waste would be collected and transported to the nearest licensed hazardous waste site which happened to be in Cape Town so it could be disposed off safely. During this period, there was a dramatic decrease in waste volumes received from ships.

1.2. Problem Statement

The problem to be researched can be summarised in the following four questions, which were prompted by the above experience -

- What caused the dramatic reduction in quantities of galley waste discharged in the Port of PE?
- Is there a galley waste management system (port and shipside) and if yes, how effective is it?
- What are compliance levels with MARPOL and SA legislation? and
- What were the chances of illegal dumping at sea as means of avoiding ridiculously high disposal costs?

1.3. Purpose of this research

The purpose of this research is to assess the understanding of the implications of MARPOL (Annexure V) regulations and applicable South African (SA) legislation through investigating current galley waste management practices in the port of Port Elizabeth and on board the ships that call at this port in order to advise on improvement areas towards implementing an effective integrated waste management system. An attempt will also be made to address key aspects that could minimize the chances of illegal dumping of galley waste at sea.

1.3.1. Objectives of the research

- i) To assess current waste management practices in the Port of Port Elizabeth as well as on board the ships that call at the port.
- ii) To determine the level of understanding and opinions of key role players
 - To investigate an understanding of the implications of MARPOL regulations in respect of galley waste handling in and from the ships, to final disposal.
 - To find out the level of compliance with these regulations and relevant SA legislation for completeness.
- iii) Identify improvement areas towards implementation of effective waste management: -
 - Effectiveness of a waste management plan
 - Cradle to grave principle
 - Serious consideration and implementation of a waste management hierarchy
 - Average waste generated per person per day
 - Monitoring system both on board the ship and port side
 - Existence and documentation of the system
 -

- Equipment on board the ship and maintenance records
- Compliance with IMO guidelines
- Condition of waste equipment

1.4. Research Method

1.4.1. Literature review

To establish the factors that influence waste management (positive and negative), available literature on waste management was reviewed to reflect the thought process and a basis to make recommendations. This section comprises chapter 2 of this document.

1.4.2. Data collection, analysis and findings

This section comprises chapter 3 of this document.

1.4.2.1. Data Collection

To gain insight into the waste management practices implemented in the Port of PE, key people from ships docking at the port during office hours over the month of August 2003, were interviewed about waste management practices on board the ship. On the other hand, key people responsible for waste management in the Port of Port Elizabeth and representatives of relevant government authorities were also interviewed about waste management practices on the shore side. This was achieved by the use of structured interview questions that were used for both ship and port personnel. Respondents interviewed were informed of the objectives of the study as mentioned in the problem statement and subsequent paragraph on the objectives of the study.

1.4.2.2. Sampling

Out of an average number of ships that dock at the Port Elizabeth harbour during office hours (08h00 – 16h00) per month, at least 40 % were targeted for structured interviews using random sampling. On the port side, representatives from the following organisations were interviewed; the NPA representatives included the Harbour Master/Marine Operations Manager, Risk Management, Environmental Management and external representatives included the Local Municipality, Port Health (DoH) and DWAF. Samples of structured questions are outlined in Annexure A and B. These guided the interviews so as to ensure consistency.

1.4.2.3. Data analysis and findings

The data collected were analysed and categorised in order to pick out trends on similarities and or common understanding of waste management practices and

compliance levels to MARPOL Annexure V regulations. These data were analysed in comparison with common and best practices in the field of waste management.

1.4.2.4. Recommendations

Based on the findings and literature review, suggestions and recommendations for the Port of PE that could be broadened to other ports when necessary were formulated. This process has a great potential to provide strategic information that could inform the design of waste management facilities for the future including the Port of Ngqura that is currently under construction. This section comprises chapter 4 of this document.

CHAPTER TWO

2.1. *The Business Perspective of Environmental Management*

White, (1993:25) states that in the 1980s, industrial capitalism generally regarded the planet's natural resources as something businesses could use as they see fit. Little thought was given to environmental pollution, overuse of resources, preservation of resources for future generations or the interest of flora and fauna. These concerns are frequently perceived to be costly impediments to economic development. Considering environmental legislation and heightened awareness levels within society, particularly consumers about the dangers of continued pollution, many businesses started seeking to conduct their businesses in an environmentally responsible manner and so is NPA. Armstrong & Kotler (2003:136) concur that, today enlightened businesses go beyond what government regulations dictate. They are developing environmentally sustainable strategies and practices in an effort to create a world economy that the planet can support indefinitely, i.e. economic and environmental sustainability.

White, (1993:25) believes that environmental ethics is one of the new and most challenging areas of business ethics. More often than not, one has to resolve problems through achieving dramatic shifts from conventional ways of thinking. Businesses have a corporate social responsibility that requires them to promote the interest of the communities and nations in which they are located. This means that businesses should move beyond just legal compliance. By so doing they earn themselves a public licence to operate in those communities and improve their competitive edge in the market.

Armstrong & Kotler, (2003:135) state that the environment involves natural resources that are needed as inputs by businesses or that are affected by business operations. Environmental concerns have grown significantly during the past 3 decades and some trend analysts labelled the 1990s as the "Earth Decade" claiming that the natural environment is the worldwide issue facing business and the public.

In most industrialised cities around the world, air and water pollution have reached dangerous levels. World concern continues to increase about the depletion of the earth's ozone layer and the resulting "greenhouse effect", a dangerous warning of the earth and most environmentalists fear the fact that we will soon be buried in our own trash. Globalisation exerts a variety of pressures in developing countries in

terms of environmental standards to be met in order to qualify to do business with them. Coupled with this, is the realisation that developing countries should take heed of the more developed and industrialised countries so as not to fall into the same traps but rather take advantage of lessons learnt.

Armstrong & Kotler, (2003:136) suggests that businesses should be aware of several trends that threaten the natural environment and advocate for business to be conducted in an environmentally responsible manner. The following three principles are important:-

- Shortage of raw materials: Air and water may seem to be infinite resources, but some groups see long-term dangers. Air pollution chokes a lot of the world's large cities and water shortages are already a big problem in some parts of the United States and the world in general.
- Increased pollution: Industry will always pose a threat to damage the quality of the natural environment. Consider the disposal of chemical and wastes; the dangerous mercury levels in the ocean; the quantity of chemical pollutants in the soil and food supply; and the littering of the environment with non-biodegradable bottles, plastics, and other packaging materials.
- Increased government intervention in natural resource management: Various governments worldwide have a variety of concerns and efforts to promote a clean environment. Developed countries such as Germany, vigorously pursue environmental quality while poor and some rich countries do almost nothing about pollution which could be attributed to the fact that they lack the required funds and political will needed to increase a worldwide environmental effort.

Bateman and Snell (2002:163) state that big businesses developed during the era of abundant resources, cheap energy and unconstrained waste disposal. This requires transformation of the way managers manage their businesses. Managing with the environment in mind requires attention to efficiency, effectiveness, and long-term goals. In actual fact environmental management must consider a mix of technical, ethical, social, and competitive issues. These days, it is hoped that most companies will accept more social responsibility and that less expensive technology could be found to control and reduce pollution (Armstrong & Kotler, 2003:136). The port business is not exempted from these challenges as it operates in ecologically sensitive areas and plays an important

role in the global village and therefore has to ensure that ships from various countries do adhere to regulations as a minimum and implement best practices.

2.2. Integrated Solid Waste Management

This section creates a context for a discussion that will ensue on integrated waste management outlining its key aspects that will guide the evaluation of effectiveness. Tchobanoglous, Theisen and Vigil (1993:3) outline the subject of solid waste management as consequences of life and therefore a reality we have to deal with and technology including ships.

Modern technological advances in the packaging of goods create constantly changing set challenges for the designers of solid waste facilities. Of particular concern, is the increase in use of plastics and use of frozen foods, which results in the reduction of quantities of food wastes in the home but, increase the quantities of agricultural processing plants.

Tchobanoglous et. al, (1993:10) define solid waste management as the discipline associated with the control of generation, storage, collection, transfer, transport, processing and disposal of solid wastes in accordance with best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations that are responsive to public attitudes. An adequate waste management facility should be functional and efficient over its useful life.

2.2.1. Solid waste as a consequence of life

History reflects that since the days of primitive society, humans and animals used the resources of the earth to support life and to dispose of their wastes. At that stage, this practice did not necessarily pose a significant detrimental impact to the environment because of the small size of the population and the amount of land that was available for the assimilation of wastes. Problems with the disposal of waste can be traced back to the time when humans began to congregate in tribes and villages and communities and the accumulation of wastes became a consequence of life.

Littering of food and other solid wastes in towns, the practices of throwing wastes into the streets, roadways and vacant land, led to the breeding of rats with fleas carrying bubonic plague that killed half of the Europeans in the fourteenth century

and caused many subsequent epidemics and high death tolls. As the society became wiser, it realised that public health control measures became a vital consideration to public officials in that, food wastes had to be collected and disposed of in a sanitary manner to control rodents, flies and other vectors of disease, Tchobanoglous et. al, (1993:3). The United States Public Health Service published the results of a study tracing the relationship of 22 human diseases to improper solid waste management, Tchobanoglous et. al, (1993:3). Ecological phenomena such as water and air pollution have also been attributed to improper management of solid wastes. These become problematic in the areas where the assimilative capacity of nature has been exceeded.

2.2.2. Functional Elements of a Solid Waste Management System

O'Leary and Walsh, (1995) and Tchobanoglous, et. al, (1993:11) have grouped the activities associated with the management of solid wastes from the point of generation to final disposal into six functional elements that were applied as an ideal framework for solid waste management system. In assessing the effectiveness of a waste management system, one would expect to find all the functional elements addressed before evaluating the effectiveness thereof. All these elements are discussed in more detail below.

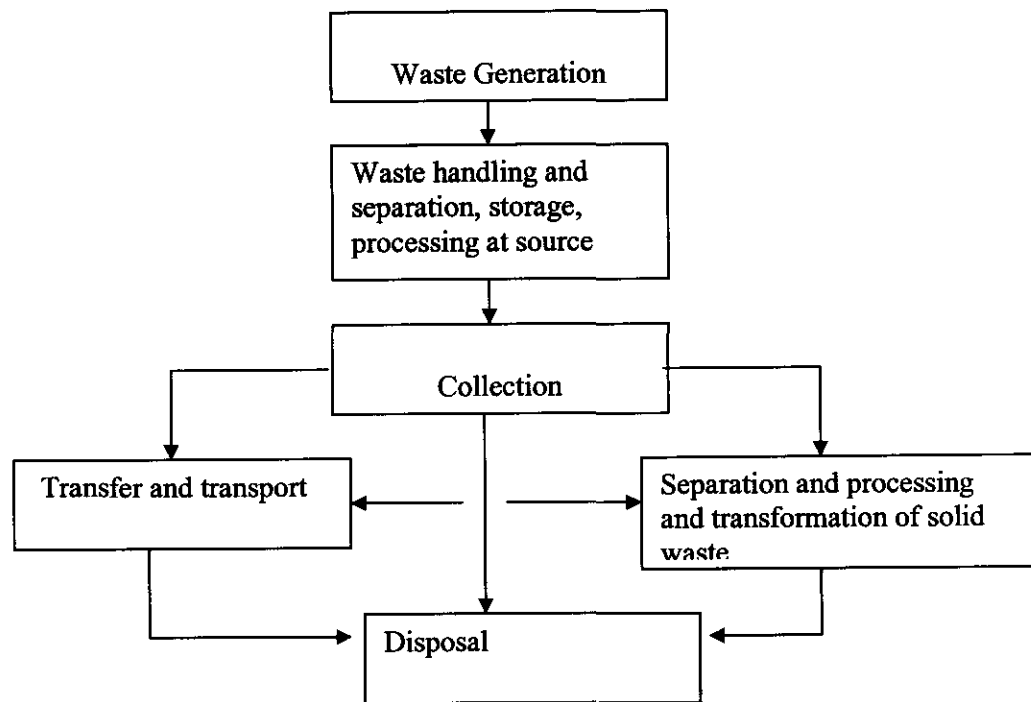


Figure 1: Reflection of interrelationships between the functional elements in a solid waste management system, O'Leary and Walsh, (1995) and Tchobanoglous, et. al, (1993:11).

2.2.2.1. Waste Generation

As reflected in Figure 1, this stage encompasses activities in which materials are identified as no longer being of value and are either thrown away or gathered together for disposal. It is very important to identify waste as the composition differs from one waste stream to the next. This aspect of waste management is not controlled. However, more controls are expected in future whereby an economic penalty system will be established to encourage waste minimisation. Source reduction is included in system evaluations as a method of limiting the quantity of waste generated.

2.2.2.2. Waste handling and separation, storage and processing at the source

This is the second of the 6 elements of the solid waste management system as illustrated in Figure 1, above. Waste handling and separation involve activities associated with management of waste until it is placed on the storage containers for collection. Handling involves movement of loaded containers to the point of collection and separation of waste components at source is an important aspect of

this step. There is an increase in awareness levels within waste generators or homeowners around the importance of separating newspapers, cardboard, bottles, yard wastes, aluminium cans and ferrous materials. On site storage is of primary importance because of public health concerns and aesthetic considerations. Processing at source involves compaction and yard waste composting.

2.2.2.3. Collection

This includes not only the gathering of solid wastes and recyclable materials, but also the transport of these materials after collection to the location where collection vehicles are emptied. This location could be a materials' processing facility, a transfer station or a landfill disposal site.

2.2.2.4. Separation, processing and transformation of solid wastes

This activity involves recovery of separated materials, separation and processing of solid waste components and transformation of solid waste that occurs away from the source of generation. These include curb side collection, drop off and buy back centres. The separation and processing of wastes that have been separated at source and the separation of commingled wastes usually take place at materials recovery facilities, transfer stations, combustion facilities and disposal sites. Processing includes the separation of bulky items, separation of waste components, and size reduction by shredding, separation of ferrous metals using magnets, and volume reduction by compaction and combustion. Transformation processes are used to reduce the volume and weight of wastes requiring disposal and to recover conversion products and energy. Biological and or chemical processes can transform the organic fraction of solid waste. The most commonly used chemical transformation process is combustion, which is used in conjunction with the recovery of energy in the form of heat. The most commonly used biological transformation process is aerobic composting. The choice of process is dependent on the waste management objectives to be achieved.

2.2.2.5. Transfer and transport

This aspect encompasses two stages, which are the transfer of wastes from the smaller collection vehicle to the larger transport equipment and the subsequent transport of wastes over long distances to a processing or disposal site. The transfer usually takes place at the transfer station.

2.2.2.6. Disposal

This is the final functional element in the solid waste management system. The disposal of wastes by land filling or land spreading is the ultimate fate of almost all solid wastes regardless of the source and it could be hazardous or non-hazardous in nature. A landfill site is an engineered facility used for disposal of solid wastes on land or within the earth's mantle without creating nuisances or hazards to the public health or safety, such as the breeding of rats and insects and the contamination of groundwater.

Tchobanoglous, et. al (1993:13), emphasize the fact that the integrated solid waste management system (ISWMS) is only in place when, all the functional elements have been evaluated for use, all interfaces and connections between elements have been matched for effectiveness and economy, and the community/organisation has developed an integrated waste management system. So, ISWM is the selection and application of suitable techniques such as application of a waste management hierarchy, technologies, and management programs to achieve specific waste management objectives and goals.

2.3. Integrated Waste Management Hierarchy

According to Tchobanoglous, et. al. (1993:15), a hierarchy in waste management could be used to rank actions to implement programs within the community and or business. The Integrated Solid Waste Management (ISWM) hierarchy as adopted by the United States Environmental Protection Agency (EPA) is composed of source reduction, recycling, and waste combustion and land filling. It is very important that ISWM programs and systems are developed in which the elements of the hierarchy are interrelated and selected to complement each other. The application of terms around ISWM hierarchy varies from state to state. However, there is clear acknowledgement that the application of the hierarchy is the core to waste management. This was applied in evaluating the effectiveness of the waste management plans.

2.3.1. Source reduction

Source reduction involves reducing the amount and or toxicity of wastes that are generated. Source reduction is the first step of the hierarchy because it is the most effective way to reduce the quantity of waste, the costs associated with its handling and its environmental impacts. This may occur through the design, manufacture,

and packaging of products within minimum toxic content, minimum volume of material, or a longer useful life. Source reduction may also occur at the household, commercial, or industrial facility through selective buying patterns and the re-use of products.

2.3.2. Recycling

Recycling is the second highest in the hierarchy and it involves:

- the separation and collection of waste materials;
- the preparation of these materials for reuse, reprocessing and remanufacture; and
- the reuse, reprocessing, and remanufacture of these materials.

Recycling is an essential factor in assisting with reducing the demand on resources and the amount of wastes requiring disposal by land filling.

2.3.3. Waste transformation

Waste transformation is the third ranking step of the ISWM hierarchy. It involves the physical, chemical, or biological alteration of wastes. The transformation of waste materials usually results in the reduced use of landfill capacity.

2.3.4. Land filling

Ultimately, something must be done with:

- The solid wastes that cannot be recycled and are of no further use;
- The residual matter remaining after solid wastes have been separated at a materials recovery facility; and
- The residual matter remaining after the recovery of conversion products or energy.

At this stage, the remaining waste could be disposed of in the earth's mantle or bottom of the ocean. Land filling is the lowest ranking step of the ISWM hierarchy because it represents the least desirable means of dealing with waste.

Considering that inadequate solid waste management has a great potential to affect people, the environment, etc, it became essential that legislation be promulgated to control and provide guidelines with respect to acceptable practices of waste management, hence a review of relevant environmental legislation follows.

2.4. Legislative Trends

Environmental legislation has become increasingly restrictive and more stringent as public health agencies, conservationists, and concerned citizens have pressured government and other relevant agencies to take action. Some countries including South Africa have included environmental rights as part and parcel of the bill of rights as enshrined in the constitution. Various governments have rightfully taken a lead in minimising the impact of waste in the form of promulgation of legislation. It is important to note that even though, shipping and harbour management businesses take place locally they are part of the global trade and therefore influenced by international, national, provincial and local factors including legislation. So, various countries have to play their part towards environmental protection in order to remain competitive and various attempts towards achieving these requirements may be costly, hence it becomes very important to have a close look at business processes with intentions to improve operational efficiencies and indirectly protect the environment.

2.4.1. International legislation

The general obligation not to cause damage to the environment outside all countries' borders (prohibition of trans-frontier pollution) was formulated in Principle 21 of the 1972 Stockholm Declaration on human environment.

"States have the right to exploit their own resources according to their own environmental policies, but also the responsibility that their activities do not cause damage to the environment of other countries"

Though the above-mentioned objective is pretty straightforward and easy to understand, higher levels of compliance can only be achieved when various countries take this matter further and enforce it in the interest of protecting their environments. In most cases, the measures that countries take on a national level can be effective to protect the natural environment, but their enforcement normally ends at the national borders, hence the need for international environmental law to guide the whole world on how to protect the environment. To mention but a few, the Stockholm Conference developed the foundation for establishment of universal rules and principles on various issues including ocean pollution control, Van Ranst, 2001). International environmental law is not only developed through negotiations leading towards international conventions or mandatory principles, but also by

international organisations that have taken an international legal position. These processes have resulted in the initiation of several important developments both on a universal and a regional scale in the form of treaties, conventions, declarations and protocols (Van Ranst, 2001). With regards to shipping and navigation, a specialised organisation was established in 1948 in a maritime conference in Geneva within the United Nations structure in London, the International Maritime Organisation (IMO). Various countries that play an active role in the maritime fraternity comprise this organisation.

The main objectives of the convention are:-

- To provide an exchange of information and cooperation among governments in the field of governmental regulations relating to shipping;
- To encourage the adoption of the highest practicable standards in maritime safety, efficiency of navigation and prevention and control of marine pollution from ships;
- To provide consideration of any matters concerning shipping and the effect of shipping on the marine environment.

In pursuit of achieving the above-mentioned objectives, the IMO has succeeded in generating a comprehensive body of rules on safety at sea and protection of the marine environment and the safe management of dangerous goods in ports. The structure of IMO provides for specific Marine Environment Protection Committee (MEPC) that is responsible for all matters relating to the prevention and control of marine pollution, with MARPOL 73/78 being an area of focus for this research.

During the late 1980's, the world was confronted with serious environmental deterioration and it immediately dawned to various governments that there was an urgent need for dialogue and action to reverse the situation at an international level. This triggered the United Nations to organise the Rio conference on environment and development, which crafted the concept of sustainable development. In Rio, it was agreed that in order to achieve sustainable development, the social, economical and environmental development policy objectives should no longer be considered separately but, equally (Van Ranst, 2001). This is a crucial balance for those serious in striving towards achieving sustainable development in order to provide a good quality environment for future generations.

Lafferty & Meadowcroft, (1996: 157 & 161) support this thinking in that, since the publication of the Our Common Future in 1987, sustainable development became an international driving force behind environmental policy. Sustainability was viewed as a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human and business needs and aspirations. A more adequate approach to this is integral life cycle management. Businesses should manage a product in an environmentally benign, efficient and socially responsible way, during all phases of its life, from raw material processing to waste disposal. Reducing waste in all of its forms may be environmentally sound but it also saves costs for organisations (Slack, Chambers and Johnston, 2001: 715). Bateman and Snell (2002:177) state that businesses gain a competitive advantage by channelling their environmental concerns into entrepreneurial opportunities and by producing higher quality products that meet consumer demands.

According to Van Ranst (2001), most countries committed to implement an action programme in accordance with Agenda 21, which addresses the following:-

- A broad scope of environmental challenges,
- A framework to promote sustainable development,
- The establishment of a global partnership between nations

Agenda 21 stresses the need for industry to promote sustainable development through:-

- responsible entrepreneurship,
- research and development and the application of environmentally sound technologies,
- Increased recycling of waste in industrial processes, and
- Introduction of more environmentally friendly product.

Agenda 21 stresses that trade and environment should be mutually supportive and since Rio, giant strides have been made to promote the integration of environmental concerns into the world trading system. When establishing the World Trade Organisation, parties to the multilateral trading system expressly recognised that their trade and economic relations in the context of the new organisation

should be in accordance with the objective of sustainable development (Van Ranst, 2001).

2.4.1.1. Marine Pollution (MARPOL) 73/78 Regulations

This is an International Convention for the Prevention of Pollution from Ships, and the Protocol of 1978 relating to the International Convention for Prevention of Pollution from Ships of 1973. In order for a country to have effective compliance assurance program to enforce MARPOL 73/78, it is very important that the Maritime Authority, Ship Owners, Inspectors and Ship Officers and Crew are fully aware of the provisions of MARPOL 73/78. According to this convention and other international maritime conventions, there are three types of control or jurisdiction over ships, which depend on the relationship between the ship and the country. These are discussed below (De Baere, 2001).

2.4.1.1.1. Flag State Control

This control focuses on the supervision of ships entitled to fly the State's Flag. The scope covers determining the existence of certain equipment and procedures as mandated by MARPOL 73/78, the approval of equipment, procedures and issuing of certificates confirming the presence and functionality of equipment and procedures. Even though some of these functions may be delegated to the ship classification societies, the state remains responsible. In the event where a Flag State authority finds non-compliance, the authority withholds applicable certificates until compliance with the terms of certificate is achieved. As part of Flag State enforcement, prosecution may be pursued and or sanctioning persons alleged to have committed violations of MARPOL 73/78 while within a Port State or Coastal State jurisdiction of another MARPOL party or within waters of a non- party, (De Baere, 2001).

2.4.1.1.2. Port State Control

This Control focuses on supervision of foreign ships calling upon the ports within that country's jurisdiction. The Port State Control involves the inspection/examination of foreign ships operating within the port, including anchorage areas. National legislation may establish the jurisdiction for such enforcement as the Territorial Waters of the State and the jurisdiction may be extended to include the Exclusive Economic Zones (EEZ) of the state for some or all of the regulations. For ships whose Flag State is a party to MARPOL 73/78,

these inspections are supposed to be a verification that the ship holds a valid Certificate and may include inspections to verify that the ship is in compliance with the Certificate.

Subsequent regulations empowered the port state control officers to inspect foreign flagged vessels where there are clear grounds for believing that the master or crew are not familiar with essential shipboard procedures relating to the prevention of pollution by garbage. Regulation 9 as adopted in 1995, requires that all ships of 400 gross tonnages and above and every ship certified to carry 15 persons or more must provide a garbage record book to record all disposal and incineration operations.

2.4.1.1.3. Coastal State Control

This Control focuses on controlling actions of ships while operating within the country's jurisdiction. Coastal State Control is very similar to the Port State Control, except that compliance assurance usually starts with the detection of a violation rather than an inspection or examination program. The Coastal State Control protects the rights of the state whose coastline and natural resources are at risk from ships that do not enter its ports, which might be considered navigating in "Innocent Passage", of which the ship forfeits when it violates the pollution laws of a Coastal State.

2.4.1.1.4. General Requirements of MARPOL ANNEX V

Garbage from ships can be as dangerous and deadly to marine life as oil or chemicals. The greatest danger emanates from plastics that can float for years before they could be destroyed and unfortunately, fish and marine mammals can mistake plastics for food and can also be trapped in plastic ropes, nets, bags, etc. This challenge gets more complicated by those people who for a long time, believed that the oceans could absorb anything that was thrown into them. This was not necessarily wrong as the oceans can in actual fact degrade certain quantities of certain materials over varied periods of time. It is therefore very important that galley waste is managed appropriately so as to minimize the risk of exceeding the assimilative capacity of the sea. For example, the following illustration shows the lifespan of materials that commonly comprise garbage from ships and the time it takes for them to dissolve at sea.

Table 1: Source: Hellenic Marine Environment Protection Association (HELMEPA)

Objects	Time taken for objects to dissolve at sea
Paper bus ticket	2-4 weeks
Cotton cloth	1-5 months
Rope	3-14 months
Woollen cloth	1 year
Painted wood	13 years
Tin can	100 years
Aluminium can	200-500 years
Plastic bottle	450 years

So, the 1973 MARPOL Convention was seeking to eliminate and reduce the amount of garbage being dumped at sea from ships which is normally comprised of all kinds of food, domestic and operational waste, excluding fresh fish generated during the normal operations of the vessel and liable to be disposed off continuously or periodically. Annex V prohibits disposal of plastics anywhere into the sea and severely restricts discharges of other garbage from ships into coastal waters and special areas. This annex also obliges the Government to ensure the provision of facilities at ports and terminals for the reception of garbage. Shipboard procedures such as keeping record of garbage with specific information about the handling method and date, time, position of ship, description of garbage and the estimated amount incinerated or discharged should be documented as required by the MARPOL regulations. This regulation is not necessarily stringent on its own, however, it probes and enables checking that regulations on garbage are being adhered to as it means ship personnel must keep track of the garbage and what happens to it. This information is vital and enhances the inspector's task as it allows for an audit trail and in the event where inspectors check sources of illegal dumping. The fact that most vessels could not avail documentary proof on how they handle garbage on board the ship for security reasons, was a clear reflection that they are not used to that kind of request which is supposed to be part and parcel of the port state control. The regulations also require that every ship of 12 metres or more in length should display placards notifying passengers and crew of the disposal requirements of the regulations in a language that is well understood such as English or French for ships travelling to other states ports or offshore terminals.

Annex V applies to all ships such as yachts, fishing vessels, all types of ships and offshore platforms to which MARPOL 73/78 applies. This Annex prohibits the discharge of garbage into sea and or restricted areas, such as:-

- The disposal of any plastic garbage into the sea including synthetic fishing nets, ropes and plastic rubbish bags,
- Dunnage, lining and packaging material which floats can only be disposed of at sea more than 25 nautical miles from land;
- Food wastes and all other garbage including paper products, rags, glass, metals bottles, and crockery, cannot be discharged within 12 nautical miles of land unless they have first been through a grinder so as to be capable of passing through a screen with openings no greater than 25 millimetres. If this reduction in particle size has been achieved, it can only be discharged at a minimum of 3 nautical miles from the land. Certain areas are designated Special Areas and Areas To Be Avoided. The following apply in these areas:
 - The disposal of any garbage other than food wastes into the sea is prohibited, and
 - Food wastes can only be disposed of at sea more than 12 nautical miles from land

Table 2: Categorisation of galley waste

Category	Type of waste
1	Plastics
2	Floating Dunnage, lining, or packaging material
3	Ground down paper products, rags, glass, metal, bottles, crockery, etc.
4	Paper products, rags, glass, metal, bottles, crockery, etc.
5	Food waste
6	Incinerator ash

2.4.2. National Legislation

The loss of biodiversity in South Africa and worldwide is of major concern and taken seriously by the NPA. By conserving our natural biodiversity, either through rehabilitation of negatively impacted areas or stringent environmental controls and management procedures of resources available to us now, we are part of the global effort to maintain diversity. The NPA's involvement in specific environmental areas within each port or associated with port activities, include the full support and

various levels of assistance within, for instance, the management of biodiversity rich areas within the port boundaries (NPA sustainability report: 2002).

The existing and pending legislation on the environment places an onerous responsibility on waste generators and land owners to ensure that their operations do not result in a detrimental impact on the environment. Organisations are compelled to act in corporately responsible and accountable manner and ensure that legal compliance is achieved in respect of the environment (Oosthuizen, 2002). The NPA as a landlord in all South African ports is not exempted to the above-mentioned obligations.

In order to change the mind set, South African organisations should move towards a more proactive role in the field of waste management by paying attention to the initial stages of an integrated waste management system such as preventive measures and implementation of effective management strategies. Prevention of waste is an essential pillar and forms an integral part of a sustainability strategy. This is evidenced by the development of the National Waste Management Strategy and the subsequent Polokwane Declaration (Zero Waste objective) that is intended to culminate in a Waste Act.

Recent research undertaken in some of our ports reflects that ports play a pivotal role in the ecosystem by providing breeding grounds for marine organisms, hence well researched ideas on what strategies to be put in place are so critical towards protecting the environment and ultimately ensuring sustainable development. The NPA through its environmental policy embraces principles of sustainable development, best practices and regards the socio-economic and environmental factors as key elements for decision-making.

2.4.2.1. The Constitution of the Republic of South Africa

The Bill of rights enshrines the rights of all South African Inhabitants and affirms the democratic values of human dignity, equality and freedom. Section 24 of the constitution states that everyone has a right to:-

- An environment that is not harmful to their health or well-being; and
- A protected environment for the benefit of present and future generations, through reasonable legislative and other measures that:-
 - prevent pollution and ecological degradation;

- promote conservation; and
 - secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.
- This section has resulted in the promulgation of new legislation and review and amendment of existing legislation so that the above could be achieved.

2.4.2.2. The Coastal Zone Management policy of South Africa

It reflects that, the South African coast is a rich national heritage that provides enormous benefits to the people of South Africa. Amongst others, it offers opportunities for future economic and social development, particularly in under-developed areas. It is so unfortunate that, in some instances, the value of coastal ecosystems as a cornerstone for development is not acknowledged in decision-making. If this behaviour could persist, valuable coastal assets and future development opportunities will be squandered unless we maintain the diversity, health and productivity of coastal ecosystems.

South Africa needs to invest in coastal management to realise and sustain the benefits and opportunities the coast offers. A radical new approach is required to manage coastal resources wisely and to harness them for sustainable coastal development. The SA coastal policy introduced a new approach whereby coastal management aims to realise coastal benefits, sustain coastal benefits and lastly promote proactive and co-operative governance.

The coast is also a site of complex inter-relationships between humans and natural systems. Although coastal ecosystems are resilient, they are finite and vulnerable to over-use, pollution and damage. This is indeed an indication that, without effective management, many of our coastal resources will be over-used and degraded to the point where social and economic benefits can no longer be derived from them. The South African coast seriously requires a dedicated, co-ordinated and integrated management approach to sustain the coastal ecosystems upon which coastal benefits depend.

South Africa is challenged by the fact that the institutional and legal arrangements for coastal management are inefficient and fragmented and fail to co-ordinate the many activities taking place at the coast. Principles for coastal management that are relevant to this research are discussed below:-

1. National heritage: The coast should be retained as national heritage, with public rights to access and benefit from coastal resources,
2. Ecological integrity: The diversity, health and productivity of coastal ecosystems should be maintained,
3. Holism: The coast should be treated as an indivisible system, recognising the inter-relationships between coastal users and ecosystems and between the land and sea,
4. Risk aversion and precaution: Coastal management efforts should adopt a risk-averse and precautionary approach under conditions of uncertainty.
5. Duty of care: Coastal management is a shared responsibility. All people should be responsible for the consequences of their coastal environment.
6. Co-ordination and integration: Coastal management efforts should be co-ordinated and integrated, and conducted in an open, inclusive and transparent manner.

Theme C of the goals and objectives of the South African Coastal Policy, deals with pollution control and waste management in the following manner:

i) Minimisation and Control: Serve to implement pollution control and waste management measures in order to minimise and strictly control discharges into coastal ecosystems.

- The discharge of all land-based point and diffuse sources of pollution that are likely to end up in coastal estuaries, ground and surface waters and the air shall be minimised and strictly controlled.
 - Treatment of pollution discharges at source shall be prevented,
 - Reduction, recycling and re-use of waste at source shall be encouraged.
 - Economic incentives shall be used to promote waste minimisation, re-use and recycling.
- The discharge of marine pollutants and waste, especially shipboard waste, marine fuels and ballast waters, into coastal waters shall be minimised and strictly controlled. In order to minimise this impact, international and national marine pollution policies and protocols ratified by South Africa shall be implemented.

It is NPA's aspirations to design procedures that are sensitive to these requirements and implement them in all SA commercial ports.

ii) Ecosystem Health and Human Uses: Are important to ensure that pollution has minimal adverse impact on coastal ecosystems and their ability to support beneficial human uses.

- Pollution control and waste management measures shall be implemented to ensure that discharges are kept within the assimilative capacity of coastal ecosystems.
 - The total loading or net effect of pollution shall be considered in allocating pollution and waste discharge permits,
- The discharge of pollutants and waste into coastal ecosystems shall not be allowed to reach levels that adversely affect human health, use and enjoyment of the coast.

2.4.2.3. Integrated Pollution and Waste Management policy

The South African White Paper on pollution and waste management (DEAT, 1998) combines the approach of dealing with pollution and waste management. It defines pollution as an introduction into the environment of any substance property, including radiation, heat, noise and light that has or results in direct harmful effects to humanity or the environment or that makes the environment less fit for its intended use. It further defines the environment as the biosphere in which people and other organisms live, such as:

- renewable and non-renewable natural resources such as air, water (fresh and marine) land and all forms of life;
- natural ecosystems and habitats, and
- Ecosystems, habitats and spatial surroundings modified or constructed by people, including urbanised areas, agricultural and rural landscapes, places of cultural significance and the qualities that contribute to their values.

The purpose of the SA policy on integrated pollution and waste management is to:-

- promote the prevention and minimisation of waste generation at source
- promote the management of and minimisation of impact of unavoidable waste from generation to final disposal

- ensure the integrity and sustained “fitness for use” of all environmental media
- ensure remediation of any pollution of the environment by holding the responsible parties accountable, and
- Ensure environmental justice by integrating environmental considerations with the social political and development needs and rights of all sectors, communities and individuals.

2.4.2.3.1. National Waste Management Strategies of SA

In South Africa, integrated pollution and waste management is defined as an approach to the management of waste in a holistic and integrated manner that extends over the entire waste cycle from cradle to grave including the generation, storage, collection, transportation, treatment and final disposal of waste. This approach brings about a paradigm shift in the sphere of waste management in that, historically, pollution control focused primarily on impact management and remediation of pollution, which is precisely end of the pipe solutions. However, the focus has moved to pollution prevention in order to ensure sustainable development (NWMS, 1999:6). Central to the development of the strategy for integrated waste management are the following:-

- Pollution prevention and waste minimisation approach that focuses on the sources of waste and has moved away from end of the pipe solutions.
- The need to extend an acceptable level of waste collection, waste transportation, treatment and disposal services.

Figure 2 depicts a waste management hierarchy approach, which is internationally acceptable as a rigorous approach to integrated waste management.


Waste Hierarchy		
	Cleaner Production	Prevention
		Minimisation
	Recycling	Re-use
		Recovery
		Composting
	Treatment	Physical
		Chemical
		Destruction
	Disposal	Landfill

Figure 2: Waste Hierarchy Steps (NWMS, 1999:7)

One of the most important objectives of Integrated Waste Management is to integrate and optimise waste management in order to maximise efficiency and minimise the associated environmental impacts, financial costs and to improve the quality of life for humans and other living organisms. The integrated waste management planning process incorporates all major stages of the environmental planning process, i.e. review of existing baseline situation & legal environment, projections of future requirements, setting objectives, identifying system components, identifying and evaluating alternative approaches for meeting requirements, and developing and implementing an integrated waste management plan (NWMS, 1999:7)

2.4.2.4. Environmental Policy of SA

The environmental policy of South Africa enables implementation of processes and plans in light of the environmental rights contained in the Constitution of this country. These rights relate specifically to the environment as well as to governance such as legal standing of parties, administrative justice, accountability and public participation. The policy embraces the concept of sustainable

development as an acceptable approach to resource management and utilization in South Africa, thus entrenching environmental sustainability in policy and practice (Environmental Policy of SA).

2.4.2.5. Polokwane Declaration

This declaration is a typical example of an effort of a multi-sectoral body having realised that waste management is a priority for all South Africans and an urgent need to take action to reduce, re-use and recycle waste in order to protect the environment. The waste summit held in Pietersburg, SA on 26-28 September 2001, had participants from all three tiers of government, civil society, and the business community.

The goal of the declaration is to reduce waste generation and disposal by 50% and 25% by 2012, respectively. The ultimate objective is to develop a zero waste disposal by 2022. Generation of waste will be around for a long time as it comes as a by-product of processes. As most countries get more developed and industrialised, we will see an increase in wastes produced without undermining concepts like cleaner production and technology. The positive aspect of this debate is that more groundbreaking technology and best practices emerge around waste minimisation, re-use and recycling of wastes produced which will eventually change the mind set from seeing waste to resource.

In line with the action plan developed at the waste summit, the NPA would like to understand the status quo with intentions to develop an informed integrated waste management plan and engage in the following:-

- Prioritization of waste management.
- Implementation of the National Waste Management Strategy.
- Development and implementation of a legislative and regulatory framework to promote waste avoidance, prevention, reduction, re-use and recycle.
- Provision of efficient and effective collection and disposal facilities.
- Disseminate information on the status and trends on waste reduction.
- Introduce mandatory waste audit processes.
- Explore the use of economic instruments to support waste management initiatives.
- Develop waste information and monitoring system.

2.4.2.6. DWAF and DoH Directive

Over the years, ship galley waste has been regarded as general waste and therefore disposed of at the municipal disposal site. With effect from September 2000, the Department of Water Affairs and Forestry issued a directive regarding disposal of ship galley waste. The directive covered the following scope:-

- All galley waste shall be regarded as a quarantined type waste, which has a potential to be infectious, and as such must only be disposed of at a low hazardous landfill site.
- Galley waste must be disinfected and pre-treated with lime before disposal into trenches at the landfill site.

The NPA, previously known as Portnet, was made responsible to ensure that the above procedure is adhered to until further notice. This directive has serious financial implications for the shipping industry as it means an increase in waste disposal costs.

2.5. Conclusion

This chapter provided evidence that waste management is a subject that should be tackled head on, given its potential to degrade the environment and the general quality of life. Furthermore, it is pleasing to realise that the governments from an international to local level have done a lot of work in this field in terms of developing guidelines that should be followed even though there are limitations in terms of enforcement. This fact actually poses a serious challenge to industry and more especially those that aspire to be world class and want to be competitive through improving operational efficiencies and earn themselves a good reputation in the global market.

The National Ports Authority of South Africa has enough scope to make a visible impact in the maritime industry as it has authority over the entire port system. Most international ports have made significant progress in the area of waste reception facilities even though it's not so clear whether or not, they have a national perspective or implement an integrated approach for waste management. I believe that serious implementation of the waste hierarchy has a great potential to change the way business is done in relation to waste management and is therefore worth pursuing for better results.

This research contains important information for the NPA to understand the status quo, performance standard and get to understand perceptions of key people in the field of waste management so it can improve its participation, involvement and influence in waste stream management.

CHAPTER THREE

3.1. Introduction

In order to gain insight into management practices in the Port of Port Elizabeth, people responsible for waste management on both portside and shipside of ships that call to this port were interviewed using structured questions that are similar with an exception of one or two questions that are specific to either of the two scenarios.

3.1.1. Portside

There are a variety of authorities that regulate waste management from the port side from an International, National, Provincial and Local perspectives and these comprise the Harbour Master, the NPA Environmental Management, the NPA Risk Management, the Nelson Mandela Metropole, the DoH and the DWAF.

The department of Environmental Affairs and Tourism (DEAT) also has jurisdiction over waste management from generation to transportation to the landfill site while the DWAF administers licensing of landfill sites. From experience, the DEAT offices are located in Pretoria, which is quite far from the ports and therefore does not play a visible role in this sphere of operation, hence they were not interviewed. This was found to be acceptable in that, the most recent waste management legislation is co-developed by both the DEAT and the DWAF. The provincial Department of Environment has limited resources that mainly deal with fire fighting rather than legal enforcement. The Departments of Health and Water Affairs and Forestry are supposed to administer the new directive on galley waste management in SA ports above and beyond their original responsibilities. The NPA personnel perform a regulatory role over the port users in a process of protecting it's assets that they are so dependent upon and also as part of the global community, to enforce legal compliance with applicable legislation. The NPA also develops policies and procedures to encourage environmental responsibility within the port and compliance monitoring, auditing and Port State control are conducted on a routine basis.

A total of six representatives were interviewed using structured questions. Only five responded to all the questions with the exception of the DWAF representative who preferred to comment on waste disposal as he/she felt that they are only responsible for licensing landfill sites and have no role to play in the early stages of the waste stream.

3.1.1.1. Limitations

The NPA perceives integrated waste management in a holistic manner from points of generation (ships) to disposal, of which the port becomes a conduit and a logistic link between ships and landfill sites. This approach is very difficult to market to government authorities as they are very articulate in defining their areas of jurisdiction, which have a beginning and an end, which does not necessarily correlate with the beginning and end of a waste stream.

3.1.2. Shiptside

Ships were chosen randomly over a period of one month i.e. August 2003 in order to conduct interviews with representatives of various types of ships (container, break-bulk and bulk) so as to ensure completeness of scope. A total of 14 ship representatives were interviewed that comprised 66.6% of the total number of ships that called to the Port of Port Elizabeth during office hours of the month of August. The feedback was analysed and findings are discussed below.

3.1.2.1. Limitations

Some ship representatives could not be reached due to operational reasons and this situation became a source of frustration as the interviewer soon realised that the success rate was quite low and learning about the great possibility of being shut out by all those who were non-compliant with waste management regulations at the time. Nonetheless the interviewer persevered until 14 ship interviews were secured. Considering that the Port of Port Elizabeth is a 24-hour port, most ships called at night and therefore fell out of the target slot, as only ships that called during the day were accessible for interview purposes due to security reasons.

3.2. Analysis of portside data

Table 3: Summary of portside results

	Yes	No	N/A
Question 1	4	0	1
Question 2	3	1	1
Question 3	1	3	1
Question 4	2	2	1
Question 5	5	0	0
Question 6	1	4	0
Question 7	2	1	2
Question 8	3	0	2
Question 9	1	3	1
Question 10	0	4	1
Question 11	3	1	1
Question 12	1	3	1
Question 13	0	5	0
Average	2	2	1
Percentage	40%	40%	20%

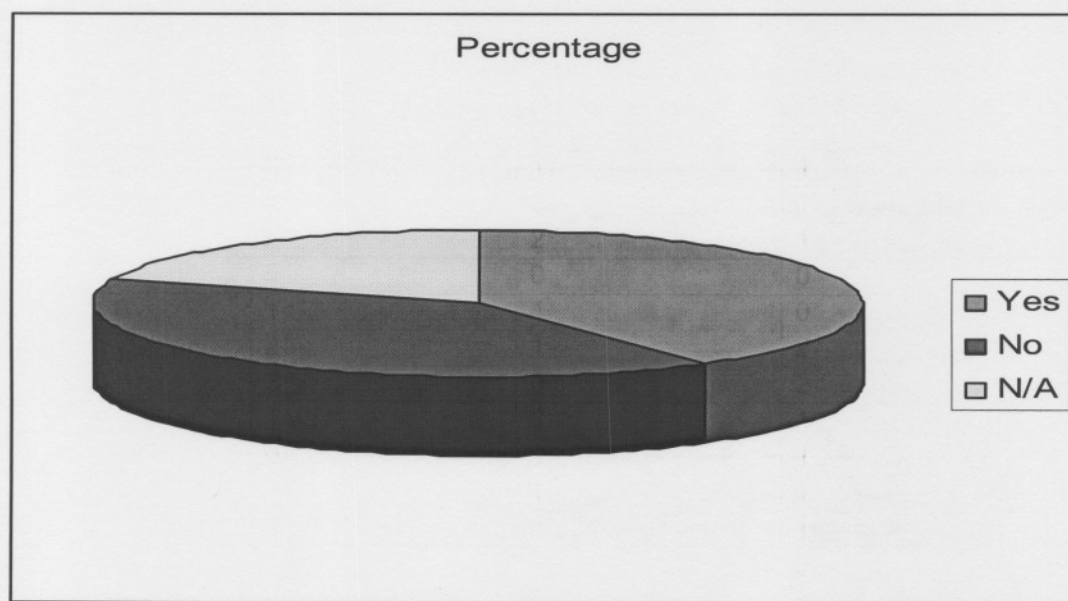


Figure 3: Chart of the portside results regarding waste handling and legal enforcement from ship to shore and shore to disposal site.

Question 1: Is there a waste management plan?

Four respondents, of which the majority is from the NPA are aware of the existence of a port waste management plan and one respondent from the DoH did not seem to know anything about it, besides insisting that his role is to inspect the ports. Responses

from government authorities are a cause of concern as one would expect them to understand policies, processes and practices implemented in the port environment in order to ensure effective monitoring. The above responses also reflect existence of a fragmented approach in relation to waste management in the port within the NPA and within government authorities. While most know of the plan, they suggested various ways on how it could be enhanced as some felt it is vague; does not encompass the entire scope of waste, not well coordinated and that it should be reduced into a user friendly procedure. Some of the NPA respondents further suggested that a waste management plan should comprise part and parcel of the safety program.

Question 2: Does the plan identify a responsible person?

Three respondents concurred in that the plan does indeed identify a responsible person while one respondent from the NPA who is expected to be more familiar with the plan disagreed and the last one did not display any knowledge around the existence of the plan as a result he had no idea about the allocation of responsibilities. This is a clear indication that implementation of the existing waste management plan is questionable as the NPA personnel would have interacted with it during implementation and therefore understand roles and responsibilities of key people. Important to note is the fact that the representative of DoH would be expected to have established contact and interacted with the NPA person/s responsible for waste management during the course of their day to day operations as compliance inspectors.

Question 3: Does the plan require logging of garbage discharged by ships?

One respondent agreed that the plan does indeed require logging of waste discharged by ships while three respondents felt that even though the NPA plan does not require logging of galley waste, it does require that quantities of waste generated should be recorded and a waste register be developed for recording all waste generated within the portside, but the plan is silent on requirements regarding logging of waste discharged ashore. The last respondent felt the question was not applicable. Considering that ships are required by IMO regulations to keep log of waste handling information en route, the shipping industry should not perceive portside requirements as extra because they are supposed to have all the necessary waste information. Aligning the portside to shipside waste management would bring completeness to a process started on board the ship such that it is auditable and therefore encourage environmentally responsible behaviour.

Question 4: Does the plan address the waste management hierarchy?

Two respondents agreed that the port waste management plan embraces the waste management hierarchy and encourages the port community to among others, separate their wastes for recycling purposes, which cannot be done with galley waste in accordance with the DoH and the DWAF directive of 2000. This directive prohibits re-use and or recycling of galley waste and requires that all galley waste be disposed off in a specified manner. The other two respondents including one from NPA felt that the plan does not address the waste management hierarchy. The fact that some NPA personnel do not think the plan addresses the waste management hierarchy is again a cause for concern when considering that the interviewee represents a section that is supposed to be implementing the very same plan and therefore questions its effectiveness. The last respondent felt that the question was not applicable. Apparently, the plan does not address the full scope of the integrated waste management hierarchy, considering that it does not mention source reduction of waste (quantity, toxicity, longer life, selective buying) and re-use of waste.

Question 5: Are receipts issued for garbage landed ashore?

All five respondents concurred that receipts are issued for waste landed ashore even though this role is played by the contractor and not the port authority which could result in the port authority not keeping or having records of this crucial information in its disposal and therefore lose the understanding of the big picture on waste management in ports which is essential for future planning and decision making around assessing the need and design issues of port reception facilities. There is no evidence that receipts are issued for waste collected from the port community. Verification of these processes should be built into compliance monitoring inspections and or audits.

Question 6: Is there a waste management-training program?

Four respondents were of the opinion that there is no waste management training program in the port but, general environmental awareness programs do exist that address waste management aspects as key components of the entire program and only one non-NPA respondent seemed to be aware of an existing waste management program. . General environmental awareness training has a potential to focus on general concepts of waste management and not address the port waste management plan as a new concept that the NPA and port users have to be familiarised with given that its success will be realised when effective implementation takes place and this can

only happen if the awareness levels have been raised. The only positive response received could be a lack of understanding the difference between the training plan developed for general environmental awareness not necessarily making the port community aware of the waste management plan that expects them to change their behaviours and play an active role in its implementation.

Awareness sessions play a critical role towards familiarising various role players with their responsibilities so they can be confident enough to make a call when necessary in the interest of environmental protection as enshrined in the constitution of this country that the environment should be protected for the benefit of present and future generations. Through adequate environmental awareness, members of society will put pressure on waste generators among others, to act responsibly so as to ensure delivery of an environment that is not harmful to the well-being of South African inhabitants.

Question 7: What is the fate of plastics, are they handled in an environmentally acceptable manner?

While two respondents agreed that plastics are handled in an environmentally acceptable manner through recycling and land filling, one indicated that nothing is done with plastics and the other two had no idea whatsoever about how plastics are handled. Environmentally acceptable practices are encouraged at all times but, recycling of plastics that are part and parcel of galley waste is actually a risk and it is contrary to the DoH and DWAF directive of 2000 which advocates for straight forward disposal as it is classified as low hazardous waste. The only way of minimising this risk would be separation from source i.e. garbage from pure galley waste, so that plastics could be recycled safely without endangering the diversity, health and productivity of coastal ecosystems that are normally resilient though vulnerable to pollution should the assimilative capacity be exceeded.

Question 8: What equipment is used in waste management, does it minimize environmental risks?

Three respondents agreed that the equipment used is adequate and therefore minimises environmental risks while two respondents preferred not to respond to the question. Obviously, the equipment used for waste management in the port ranges from skips, plastics to trucks that transport waste in skips to the landfill site. These are

considered adequate for the purpose more especially if they are designed to totally avoid or minimise chances of secondary pollution in the port and en route to the landfill site. Also, considering the onerous requirements imposed by the DWAF in conjunction with the DoH on galley waste management, one would expect them to play a more visible role in overseeing this task so as to ensure that all equipment used does indeed meet their requirements.

Question 9: Are there maintenance records for the equipment?

One respondent was positive that maintenance records for waste management equipment are available while three respondents indicated that they understand that since this function is outsourced, then maintenance records reside with the contractor who has never been requested to produce proof that he is in actual fact disinfecting the skips in accordance with a process specified by the directive on galley waste and therefore adopted a precautionary principle and denied existence of these records until they have seen them. The last response from a representative of the inspection authorities was an excuse that they do not deal with such issues. There seems to be a lack of understanding from the NPA side, of the importance of effective monitoring of the performance of the contractor considering serious implications that would ensue if the contractor was to short circuit the process and contravene existing legislation.

Question 10: Is the port waste management plan followed, if not, do practices follow the IMO guidelines?

Four respondents including the NPA representatives honestly admitted that they are not in a position to give an opinion around strict adherence to the plan because they have not done justice in terms of monitoring and enforcement. Also, there was a clear response that the waste management plan as it stands is not specifically informed or aligned with IMO regulations considering that the comparison has not yet taken place and this was visible as most were not at all familiar with these regulations. The last interviewee preferred not to respond to this question.

Question 11: Is there a suspicion of illegal discharge?

Three respondents suspected that illegal discharge is rife though they were not in a position to prove it while one does not think it is possible and the last interviewee did not respond to this question. I think this is everyone's challenge as it is somehow

difficult to catch ship crew in action and rather put more emphasis on the system documentation as it could be audited and reputable conclusions be drawn.

Question 12: Can illegal discharge be proved?

All these responses are based on perceptions as it is clear that SA has not reached an acceptable level of maturity in terms of enforcing the IMO regulations, hence most interviewees were hesitant to adopt a clear standpoint as they felt there isn't sufficient facts to base one's decision. Nonetheless, one respondent that adamant that illegal discharge can be proved while three felt that it couldn't be proved and the last respondent felt the question was not applicable.

Question 13: Does the pricing structure encourage environmentally acceptable practices?

The port charges for galley waste are based on volumes and not built into the port charge whereby every ship would be encouraged to dispose off their wastes in an environmentally responsible manner as they would soon realise that they have to discharge their waste in the port as it would not make any financial difference if they discharge it illegally. This would ideally reduce the risk of illegal dumping in the ocean however; it would make the lives of self-sufficient ships difficult as ports would charge them while they handle their waste in an acceptable way. So, the current arrangement is such that, the more the volumes of waste discharged, the more the costs become.

3.3. Analysis of shipside data

Table 4: Summary of the shipside results

	Yes	No	N/A
Question 1	13	1	0
Question 2	13	1	0
Question 3	13	1	0
Question 4	13	1	0
Question 5	12	1	1
Question 6	13	0	1
Question 7	13	0	1
Question 8	13	0	1
Question 9	11	2	1
Question 10	10	4	0
Question 11	2	11	1
Question 12	0	12	2
Question 13	0	8	6
Average	9.7	3.2	1.08
Percentage	69%	23%	8%

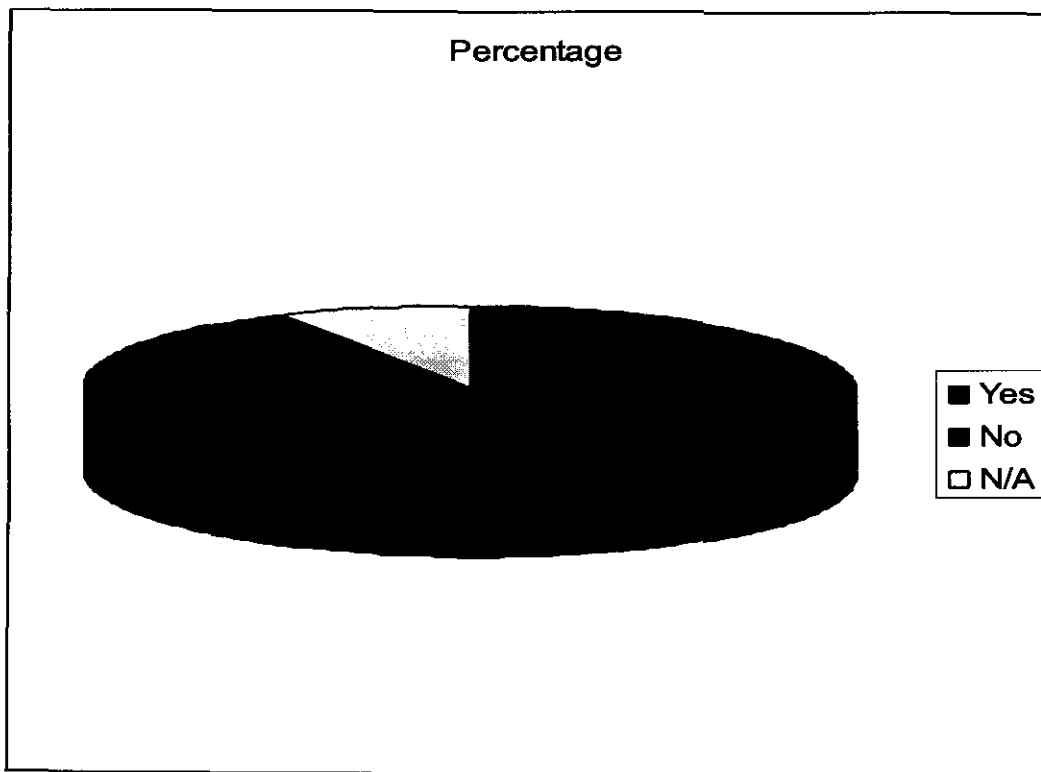


Figure 4: Illustration of the shipside results about waste handling on board the ship.

Question 1: Is there a waste management plan on board the ship?

Thirteen respondents easily confirmed the availability of waste management plans on board the ships while one disagreed. Some of these provided proof of such and others could not produce evidence due to security reasons. It was pretty clear that ships understand their waste management obligations as captured in the waste management plan which happened to be a consistent document that others have modified with intentions to make it more user friendly and generated posters from it. Considering that all ship representatives were well aware that the interviewer is the NPA employee, they should have easily availed these documents. Failure to produce evidence became a cause for concern, as it is highly possible that the security reasons provided were a smoke screen yet non-compliance remained the issue at hand.

Question 2: Does it identify a responsible person?

Again, there was a uniform response from thirteen respondents who concurred that the waste management plan identifies the responsible person as the Chief Officer in the ship and one disagreed due to the fact that they do not have a waste management plan. What is fascinating about the positive response here is that the responsibility of waste management on board the ships seems to be dealt with in a consistent manner whereby instead of appointing a person at a time, it is understood to be part and parcel of the Chief Officer's job description. This approach has merits in that it lessens possible confusion and the Chief Officer is quite senior and therefore most likely to be respected and this is indicative of the importance allocated to waste management in order to ensure effective implementation.

Question 3: Does it require logging of garbage discharges at sea in the ship's garbage log?

Thirteen respondents concurred in that the waste plan as informed by the IMO regulations requires continuous logging of waste handling and management strategies including volumes en route as well as keeping record of waste discharged ashore. The only negative response received was in support of the fact that one ship had no waste management plan on board the ship.

Question 4: Does it address waste management hierarchy?

Thirteen respondents concurred in that their waste management plans do seriously address various aspects of the waste management hierarchy such as waste minimisation and separation of waste from sources. However, they have limitations in terms of recycling galley waste, as South Africa ports do not encourage recycling of galley waste ever since the galley waste directive was issued in 2000. Again, only one respondent disagreed with addressing waste management hierarchy though he emphasised the fact that they dispose of their waste in more efficient ports. This could be a result of the pricing structure that does not recognise efforts made by various ship crews in separating their waste such that some of it could be re-used and or recycled. However there is no excuse for not addressing waste minimisation as it would ultimately reduce the amount of waste due to be discharged ashore and therefore reducing the environmental challenges posed by large volumes of waste generated and increasing the demand for landfill sites.

Question 5: Are there receipts for garbage landed ashore?

Twelve respondents agreed that the contractor does issue receipts for waste discharged reflecting the amount and type of waste collected. While one respondent indicated that they normally discharge their wastes in more efficient ports however, receipts were not issued for waste discharged. The last respondent made his point clear that some SA ports haven't got reception facilities hence they prefer to incinerate their waste on board which does not require any receipt besides logging in the ship's waste log book. More efficient and effective waste handling processes including issuing of receipts offer an opportunity to track waste discharge patterns and environmental performance of each vessel at any time.

Question 6: Is there a waste management-training program?

The awareness level with ship crewmembers was an indicator of an existence of a training program around waste management. Thirteen respondents are aware of waste management training programmes that form part and parcel of the induction program that all new crew members go through and one responded did not respond. Some also regard the instructions given by the Chief Officer as awareness sessions as he would elaborate why disposal of certain wastes is prohibited in various areas such as environmentally sensitive areas or within certain distances at sea.

Question 7: What is the fate of Plastics, are they handled in an environmentally acceptable manner?

Most respondents to the total of thirteen stated that they handle plastics in an environmentally acceptable manner, for example, twelve respondents discharge plastics ashore as part of galley waste while one incinerate them. The last interviewee did not respond.

Question 8: What equipment is used for waste management, does it minimise environmental risks?

Most ships use a combination of waste management equipment and strategies with the majority of twelve respondents saying they use an incinerator as well as the communitator (grinder), one respondent reflected that they use a compactor mainly and also incinerate some of their waste and the last respondent had no response. It was not so clear from the responses provided when and why they use certain equipment or strategy but pleasing to see that most kept their records to reflect quantities and methods used to deal with waste.

Question 9: Are there maintenance records of the equipment?

As part of Port State control the condition of equipment is inspected with intentions to understand whether or not they are functional, because using faulty equipment for example, to incinerate waste could have detrimental effects on the environment. The IMO regulations require that they keep records for maintenance of equipment. Eleven respondents concurred that they do keep maintenance records of their equipment though they could not share that information with the interviewer, two respondents stated that they do not keep these records and the last respondent had no response.

Question 10: Is the plan followed, if not, do practices follow the IMO guidelines?

Ten respondents stated confidently that they comply with IMO guidelines and regulations on galley waste and the majority produced evidence of such and four respondents could not provide clear and straightforward answers in this regard. Even with the four that could not answer, there were visible indications that they are familiar with the waste management plan and understand what is expected of them. However,

they lacked the bigger picture, as they could not link the plan to IMO guidelines and regulations.

Question 11: What is the expected daily waste production per kg/person, does it balance?

This question seeks to understand whether all waste is accounted for or not. It provides a thought process that should be followed in analysing waste handling methods and their effectiveness. The volumes of waste produced per person per day varied from 0.5kg, 1kg, 2kg, 4 cubic meters, and 5 cubic meters. This is a reflection of confusion as I am of the opinion that one person cannot generate 4 or 5 cubic meters of waste per day, not unless some were referring to cargo waste. When pursuing the matter with intentions to understand whether the waste balance is achieved or not, eleven respondents accepted the fact that there is no balance in [waste generated per person per day minus waste handled and managed en route, for example incinerated, etc = balance of waste on board the ship]. Two respondents were convincing enough that their waste balances off and supporting documentation confirmed the view and the last respondent had no idea of what we were trying to get at.

Question 12: Is there a suspicion of illegal discharge?

Understandably so, none of the shipside respondents suspects illegal discharge of waste and twelve ruled out the possibility altogether and the last two chose not to respond to this question. By implication, this is a reflection of sound waste management practices that have a positive impact on the marine environment however, there could be a difference between the answers provided here versus reality.

Question 13: Can illegal discharge be proved?

The majority as reflected by eight respondents felt that in most cases, illegal discharge cannot be proved as one would have to catch the crew members in action and provide evidence that indeed they were doing it and provide coordinates that prove that it was also in an acceptable area and where possible take photos as evidence which is all a bit difficult to do. The rest of the respondents to a maximum of six, did not respond to this question due to the fact that they do not believe illegal discharge is possible which could be associated with loyalty and commitment to complying with IMO regulations or avoiding to alert authorities of various possibilities that could lend them in trouble.

3.4. Summary of findings

This summary is presented in accordance with the problem statement of the research.

3.4.1. Reduction in quantities of galley waste in the Port of PE

Questions 11-13 in the Portside questionnaire were seeking to gather information that when analysed would provide an idea into the reduction of galley waste quantities in the Port of PE. Considering that the National Ports Authority of SA is privileged to operate the port system that comprises 7 ports, it enjoys unique strategic positioning whereby it could ensure that a consistent approach could be adopted to deal with matters of common interest such as waste management. The fact that Port State Control does not pay serious attention to management, is an invitation of unacceptable behaviour hence some ships produced incompletely filled garbage logs and none of them have been prosecuted for that contravention. On the other hand, some ship personnel responded by saying they only dispose off their wastes in a more efficient and cost effective port such as Cape Town, which has a nearby low hazardous waste landfill site.

The possibility of illegal dumping cannot be ruled out since some ships do not complete the garbage logbook and still operate without receiving any penalties or fines. Secondly, there seems to be a lack of coordination among ports in that the galley waste contractor assumes full time responsibility and not monitored closely by the Port Authority, as they are ultimately responsible for the waste received from ships. The price structure also encourages bad habits in that ever since the galley waste directive was issued, recycling is discouraged which means that waste would be separated on board the ship and payment would be expected for "real" waste considering that recyclable materials is considered as a resource.

In SA, all garbage received from ships is disposed off at a low hazardous landfill site so as to minimise the spread of contagious diseases, meaning that whether or not a ship has discharged more recyclable material than real waste, it pays for the total amount of waste discharged regardless of the quality as opposed to paying for non-recyclable waste or charging a flat rate as a way of encouraging acceptable behaviour.

Secondly, considering the problem that was experienced by the PE region during that time and the high disposal costs and in line with the responses to question 13 of the portside questionnaire, the authorities concurred that illegal dumping of waste does

take place while the vessel representatives disagreed. This could be seen as a matter of failing to admit guilt. Since the ocean is clearly a national heritage that should ideally be guarded by all citizens of this country, it is however very difficult to achieve this as most communities are far away from the coast. The command and control approach would go a long way in SA hoping to catch the vessels in the act and this could be very costly to maintain as it means the SA government would need to have more patrol boats guarding the South African oceans and enforcing the Do's and Don'ts of the regulations, with serious consideration of Table 1. Instead, the SA approach should be procedural and have elements of self-regulation whereby it requires documentation of all actions taken in accordance with the ship's waste management system and provide specific information about the exact points where various waste management actions were taken, so it is auditable. Ships that fail to produce fully completed and up to date logbooks should be fined as means of discouraging unacceptable behaviour.

3.4.2. Integrated waste management practices

As stated in the literature review, integrated waste management practices are realised when the organisation in question has an integrated waste management plan that addresses key functional areas of waste management as illustrated in Figure 1, and applies the waste management hierarchy illustrated in Figure 2, so as to minimise the ultimate amount of waste produced which translates into the nature of environmental challenges it poses, given the handling methodology employed. So, questions 1-9 were seeking to evaluate waste management practices that are implemented in the port of Port Elizabeth and on board the ships and to allow for identification of improvement areas.

The key functional areas of waste management start with generation at source, collection, handling, transportation and the disposal stage. The waste management hierarchy is a fundamental framework in the field of waste management and it solicits that, at each stage of waste management functional areas, one should explore opportunities to avoid or reduce waste from source, re-use or recycle some of the waste material to minimise the amount to be disposed off at a landfill site as a last resort. The waste generated by ships en route is collected, handled in various ways on board and the remains are discharged at the port reception facilities. The Port Authority assumes responsibility for further handling of discharged wastes and appoints a contractor to handle it on its behalf; hence the cradle to grave approach is ideal in order to make the necessary arrangements on the portside. Legislation states that the waste generator remains responsible for waste until it has been safely disposed off. One way

of controlling this process while ensuring legal compliance, is by requesting safe disposal certificates from contractors.

Even though the majority of respondents concurred that waste management plans were available, there was a clear lack of a consist approach on the port side in terms of what this plan should contain and look like in order to make it user friendly and therefore achieve the objectives it is set to achieve. The lack of an integrated approach in dealing with waste generated, sorted and handled by ships and galley waste reception facilities in ports is a cause for concern as efforts made by one of these parties (portside Vs shipside) are not acknowledged by the other. An example at hand is that ships go to various international destinations and other countries still regard galley waste as general waste and therefore charge reasonable rates.

The port's waste management plan deals with waste generally and is silent on galley waste management. Instead there is a stand-alone policy for galley waste that is administered by a separate department from the one that is custodian to the waste management plan. It is reflected in responses to question 10 that IMO regulations were not consulted when developing the waste management plan for the port hence the ship and portside do not speak the same language around waste management.

3.4.3. Compliance levels with IMO regulations

Considering the sensitivity of the port environment i.e. the interface between terrestrial and aquatic environments, it is crucial that ports adopt an integrated approach to waste management and ensure risk minimisation by addressing the key elements of an integrated waste management system inclusive of the waste hierarchy.

3.4.3.1. Scope of waste management systems

Based on the solid waste management framework as illustrated with six functional elements in Figure 1, the shipside appears to be more organised and has a more comprehensive approach compared to the port side, as reflected by the existence of a consistent and all encompassing approach to galley waste management. The challenge ships have, is with implementation considering that some ship personnel chose not to provide proof due to what they called security reasons. This could mean that they understand the theory behind the subject but they don't practice it, which was going to be easy to determine from the galley waste log. In accordance with IMO regulations, they all classify their waste into six categories as reflected in Table 2 and

the galley waste logbook, which is updated on a continuous basis and kept on board the ship.

The portside waste management plan is segmented in that it was designed to address all other types of waste excluding galley waste and the fact that a different department to the one that administers general waste management manages the galley waste policy in the port. There are no indications that the port and ship plan compliment each other in a seamless manner so as to ensure consistency and continuity. Indications are that the portside waste management plan is highly ineffective in as far as galley waste is concerned. The fact that the NPA personnel who are supposed to be implementing it say it is vague. This is a reflection that it is not being implemented. The galley waste policy is administered by a separate department to the one that is a custodian of the broader waste management plan, which is indicative of the lack of a holistic picture and approach.

The integrated waste management approach starts at the waste generation to disposal phase, as reflected in Figure 1. Considering the fact that galley waste generation, separation, collection, recycling and handling take place on board the ship and disposal takes place on the port side, it is very important to align the 2 procedures more so when considering that all the hard work done on board the ship in the interest of environmental protection could be trivialised if the receiving port is not up to scratch with it's waste management program. Nothing suggests that a waste management hierarchy is seriously considered nor implemented, for example, the responses are very quiet on waste avoidance and or minimisation strategies. The focus seems to be in environmentally responsible disposal practices and ensuring that they dump acceptable waste material at sea in accordance with regulations.

The commitment and attempts towards recycling are visible, however, since galley waste was reclassified in South Africa to low hazardous waste, and it cannot be recycled. It should instead be disposed of in accordance with the directive of the Department of Water Affairs & Forestry and the National Department of Health.

Within NPA, suggestions have been put forward to improve the current plan so it could address the entire scope of waste management in the port including office waste and classify it accordingly. There is also a feeling that though there is a waste management plan, it is vague and therefore confusing to others more especially the one who are expected to implement it. Though NPA has outsourced galley waste removal to a

contractor i.e. Waste-tech in Port Elizabeth, it does not look like the NPA has an influence over this process since the contractor provides the entire service to the shipping lines including issuing of disposal certificates. The NPA plan does not make any indication that the contractor is expected to submit any information in relation to this matter to the Port Authority, except for information required in order to process payment.

3.4.3.2. Accountability and Documentation

On the shipside, there is consistency and enough evidence that the waste management plan identifies the responsible person, which is normally an add-on function to a rank of Chief Officer rather than an individual.

On the port side, the plan does not identify a responsible person and the custodians of the broader waste management plan are the Environmental Department while the galley waste policy resides with the Risk Department. There seems to be an element of confusion on the port side as to where the waste plan should reside. However, the majority of respondents would like it to be part of a safety program rather than a stand-alone.

The above scenario is a reflection that on the portside, there is no clear accountability on waste management. This could be exacerbated by the fact that Port State, Flag State and Coast State inspections are done by other parties not the Risk and Environment departments. The government authorities also conduct inspections in the port though this process identified a gap in that they conduct inspection without understanding the port waste management strategies.

3.4.4. Legal Compliance Generally including IMO Regulations

Question 10 seeks to gather information around the understanding and compliance levels in relation to waste management. The shipside is well aware of the IMO regulations in relation with waste management and that they should keep records of waste log on board the ship, hence this author suspects some of the shipping lines that gave excuses for providing hard core evidence of what they were referring to, were well aware of the fact that they have not done a thorough job. Provision of proof that the information requested was for the port authority, was not convincing enough to the interviewees such that they could release their sensitive information. This behaviour could be attributed to the lack of visibility of inspectors and clear understanding of

whom in the SA ports is the appropriate person to have a discussion of this nature with. The environmental department stated that when they were developing a waste management plan for the port, they did not review IMO regulations on waste management which could be associated with the fact that galley waste policy and management are administered by other departments.

3.4.5. Awareness and opinions of key role-players

Questions 11 and 12 of the portside questionnaire as well as 12 and 13 of the shipside questionnaire solicit input in this regard.

On the portside, the IMO regulations were not considered in developing the waste management plan for the port except for national, provincial and local bi-laws, which could be attributed to low levels of awareness in relation to international legislation.

The representatives from the government authorities seemed fixated on their piece meal approach to overseeing waste management activities. The Department of Water Affairs and Forestry maintained a stance that they only issue permits for landfill sites and not interested in what happens upstream. The author found this very strange considering that the very same department issued a directive on how galley waste should be handled. Integrated waste management could only be complete if the entire waste stream is monitored on whether the NPA or its contractor adheres to the procedure or not. Port Health had no idea about the existence of a port waste management plan because all they are interested in is the shipside. The local municipality seemed more clued up about waste management practices in the port and they also have a plan that compliments industry in terms of the services they provide.

3.5. Comparative analysis

The Portside results as reflected in Table 3, reflect a serious element of confusion in that 40% of the respondents agree while another 40% disagrees that the port implements an integrated, environmentally sensitive waste management plan that is well communicated and understood by those who play a key role in its implementation. The remaining 20% was indifferent.

The shipside results as reflected in Table 4, reflect very high levels of awareness, commitment and full accountability for waste management on board the ship. This is evidenced by 69% of ship representatives who concur that ships implement integrated

and environmentally sensitive waste management plans that are well communicated and understood by crew while 23% disagreed and only 8% were indifferent.

CHAPTER FOUR

4.1. Recommendations

South Africa is renowned for its diverse range of biodiversity which plays a crucial role in the economic development of the country and coupled with the long and open coastline, they play a vital role in enhancing the tourism industry hence the protection of the marine environment is essential. These recommendations are informed by the PE experiences and legal requirements. The NPA has to conduct a gap analysis in all ports in terms of compliance with legislation, pollution prevention intervention, best practices and continuous improvement in order to establish a baseline.

1. Legislation requires that ports should make provision of port reception facilities so they can provide the service to ships. The reception facilities audit should consider the type of infrastructure available against the demand for the service and streamline the process such that the NPA does not loose control over this function even if it has been outsourced. The reception facilities should facilitate separation of waste from recyclables and be clearly and consistently labelled for specific purposes.
2. The baseline information would then inform the organisation as to the intervention strategies required in order to address the problem/s. One of those should be the development of a national waste management policy that could be customised by various ports to address port specific issues. The main thrusts of the policy should be alignment with IMO regulations; use of common language between ports and ships; the holistic approach that links the ship board activities to the port side. Of more importance is that it should be premised on the principles of a waste hierarchy; the polluter pays principle and require documentation of activities both on board the ship and within the port.
3. There is a great need to develop awareness programs around ship waste management so as to build capacity within various sectors of society so they can easily distinguish between right and wrong and inform the relevant authorities of unacceptable practices and suspicious actions. According to De Baere, (2001) experience has taught him that public awareness and participation can play a big role in reporting violations, and in applying public pressure to consumer oriented operations, such as cruise liners. He further on says, especially on cruise ships, the potential for a bounty i.e. receiving part of

any fine imposed, generates interest and vigilance on the part of the passengers. He believes strongly that attention must be given to the cruising yachts, other pleasure boats and fishing boats. Public awareness is likely to be most effective when the programs are directed at the marinas and fishing docks. Programmes can also be directed at organizations, such as yacht clubs, fishermen associations, etc. There is also a clear understanding that marine debris is not only generated from ships but, it is estimated that 60-80% of the marine debris is land-generated. This fact necessitates a broader approach to public awareness such that the focus is not on the shipping and boating industry alone but also on broader solid waste management. The awareness programs should be designed such that they are adequate for the target audience. The port personnel, NPA personnel, authorities and inspectors so as to create a common understanding; pass a consistent message and streamline requirements and expectations for clients.

4. There is an urgent need to finalise national legislation that should also cover issues of ship/port wastes. It is quite important that international legislation is consulted so there could be alignment and between the country's legislation and its international obligations so that there could be straight forward requirements that do not duplicate or contradict each other. It is believed that successful implementation of MARPOL 73/78 Annex V, and all other Annexes, is dependent on successful integration of these requirements into national legislation and adequate enforcement strategy for solid waste management and other pollution vectors in their entirety.
5. Policy should provide a basis for a procedure that spells out the objectives and targets as well as key initiatives to be implemented in order to achieve the desired results. De Beare (2001), also hinted that in order to prove a case successfully:
 - One has to produce direct photographic evidence, which is indeed very difficult to get.
 - Inspections and investigations into reports of discharge that rely on detailed analysis of the waste stream of the ship should be conducted.
 - Need to establish what wastes should have been generated, what was properly removed, what is remaining? If there is a difference between the removed waste and what is remaining, there might be a possibility of prosecutable violation case.

- Require safekeeping of safe disposal certificates for a period of at least 3 years. This emphasises the importance of documentation of waste handling activities so as to create an audit trail.
6. The Port Authority should review its approach to waste collection rates and explore avenues such as introducing a flat rate for waste management so that discharging of waste is not perceived as a costly exercise but a must because it is paid for after-all. This would reduce chances of illegal dumping at sea and encourage everyone to discharge their waste at a reception facility in the port.
 7. The Port Authority could also minimise chances of illegal dumping by seriously monitoring adherence to MARPOL regulations by scrutinising garbage log books, developing a system of tracking and verifying facts about discharge methodologies stated in the log book. The detailed investigation on its own tends to become an awareness or education session for the ship and a possible deterrent to illegal discharges.
 8. The waste management procedure should be easy to understand and identify responsible people from the Port Authority side, who preferably would work hand in glove with Port State Control inspections for maximum efficiency. This information should be public knowledge and allow for registration of complaints and whistle blowing.
 9. Heavy fines should be introduced for those who fail to document the information required in a logbook and any other offences.
 10. Holistic government authority reviews should take place including reviewing the NPA policy, procedure and actual implementation of activities on the ground, specifically evaluating the adequacy, effectiveness and efficiency thereof.
 11. NPA should introduce a national system of receipting that would ensure tight controls between various ports and within SA boarders.
 12. The galley waste directive is becoming a stumbling block to responsible waste management as it requires that all waste that was sorted from source on board ships into recyclables, etc. is on the portside collected into one skip and disposed off at an expensive rate. This discourages recycling initiatives, as it

does not matter anyway. The reclassification of galley waste is not the best practicable environmental option as it could be addressed differently by ensuring that specific categories of galley waste are not recycled but disposed of safely at a general landfill site. A lot of resources go into disposal of galley waste that I personally think is not harmful if handled properly.

13. The waste management policy and procedure should be reviewed periodically to ensure relevance.
14. The NPA personnel should form a key element of the government authority audit/ inspection teams when assessing activities of the port community.

There is substantial room for improvement in this field and the government has developed legislation that attempts to address the waste management crisis and the implementation is not as expected. This is unfortunate because the government that is expected to improve policing adherence to waste management laws, has bigger challenges to deal with and industry has to prove it's corporate citizenship and duty of care by making a difference in their areas of operation.

ANNEXURE A

Structured Interview Questions: Galley Waste Management	
Shipside	
Name of the ship	
Type of ship	

#	Question	Response
1	Is there a waste management plan on board the ship?	
2	Does it identify a responsible person?	
3	Does it require logging of garbage discharges at sea in the ship's garbage log?	
4	Does it address waste management hierarchy	
	Waste minimisation	
	Recycling	
	Separation of wastes from source	
5	Are there receipts for garbage landed ashore?	
6	Is there a waste management training program?	
7	What is the fate of plastics?	
8	What equipment is used in waste management?	
	Compactor	
	○ Incinerator	
	● Comminutator	
9	Are there maintenance records of the equipment?	

	<ul style="list-style-type: none"> • Does it work? 	
	<ul style="list-style-type: none"> • Is it properly maintained? 	
10	Is the plan followed, if not, do the practices follow the IMO guidelines?	
11	What is the expected daily production per Kg/person? <ul style="list-style-type: none"> ○ The number of days at sea? 	
	<ul style="list-style-type: none"> ○ Amount incinerated? 	
	<ul style="list-style-type: none"> ○ Estimate the amount of garbage on board? Do calculations balance, if not, why?	
12	Is there a suspicion of illegal discharge?	
13	Can illegal discharge be proved?	

ANNEXURE B

Structured Interview Questions: Galley Waste Management		
Portside		
Name of the Department		
Role of Interviewee		
#	Question	Response
1	Is there a waste management plan?	
2	Does it identify a responsible person?	
3	Does the plan require logging of garbage discharged by ships?	
4	Does the plan address waste management hierarchy?	
	Waste minimisation	
	Recycling	
	Separation of wastes from source	
5	Are receipts issued for garbage landed ashore?	
6	Is there a waste management training program?	
7	What is the fate of plastics?	
8	What equipment is used in waste management?	
	○ Transportation	
	○ Disposal	
	○ Collection	
	○ Handling	
	○ Recycling	
9	Are there maintenance records of the equipment?	
	● Does it work	

	<ul style="list-style-type: none"> • Is it properly maintained 	
10	Is the plan followed, if no plan, do the practices follow the IMO guidelines	
11	What is the expected daily production per Kg/person? <ul style="list-style-type: none"> ○ Numbers of passengers on board the ship? 	Do calculations balance, if not, why?
	<ul style="list-style-type: none"> ○ The number of days at sea? 	
	<ul style="list-style-type: none"> ○ Amount incinerated? 	
	<ul style="list-style-type: none"> ○ Estimate the amount of garbage on board? 	
12	Is there a suspicion of illegal discharge?	
13	Can it be proved?	
14	Pricing structure?	

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