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The Vessel Traffic Management System at the Batangas Baseport: Basis of Enhancing Vessel Traffic Services at the Batangas Bay

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Abstract - This study assessed the status of implementation of the Vessel Traffic Management System at the Batangas Baseport. Specifically, it determined the previous and current state of marine traffic in Batangas Bay, identified the marine hazards that have become evident at the Batangas Bay Area and determined the vessels' compliance with the rules or provisions of the VTMS and the subsequent imposition of penalty fees for non-compliance. The study utilized the descriptive method of research. Personal interviews were conducted with the management and concerned offices. The gathered data were analyzed using frequency, rank, sum, mean, percentage and ratio. Results showed that there was heavy marine traffic during the period under study. Most marine accidents involved collisions and grounding while spill incidents were mainly oil or oil products of small manufacturing companies, cargo ships or tankers were relatively small in quantity compared to world record of oil spills. There was an effective implementation of the Vessel Traffic Management System at the Baseport evidenced by the vessels' compliance with the provisions of the VTMS that has resulted to avoidance of accidents. The reasons of non-compliance are generally minor in nature which requires minimal penalty fees.

Keywords - Vessel, Base port, Traffic, maritime

INTRODUCTION

Maritime safety, efficient maritime transport and navigational system as well as safety of humans and the environment are among the prioritized concerns of those engaged in maritime industry such as the Philippine Port Authority-Port Management Office Batangas. As a recently converted international port, the Batangas Base Port provides services to foreign vessels and cargo ships that enter and leave Batangas Bay. Through its vessel traffic services, it ensures the safe and efficient handling of traffic in the Batangas Bay whose strategic location .on the southwestern coast of Luzon, being adjacent to the South China Sea and nearby Visayan Sea, has contributed greatly to a remarkable increase of domestic and foreign vessels calling at the port. This increasing maritime traffic may impact considerably on the vessel traffic system being implemented in the Batangas Bay area. In the light of internationally instituted maritime regulations which aim to minimize the marine accidents and mishaps at sea, it is important that the Batangas Port management continuously monitor vessel movement and operations in the Bay. As members of the academe belonging to the only maritime educational institution in Batangas Province, the researchers believe that a study on the vessel traffic services offered at the Batangas Bay through the established Vessel Traffic Management System at the Batangas Base Port would benefit not only the academic community of the LPU Maritime Academy but also the maritime agencies and officials in the Batangas Base Port who implement the maritime regulations relative to vessel traffic services

Among the International Conventions on Sea Safety, the SOLAS Convention (Safety of Life At Sea) in its successive forms is generally regarded as the most important of all international treaties concerning the safety of merchant ships. First adopted in 1914, the document has undergone several amendments the latest of which were dated December 2008 on mandatory International Code, enforced on January 2011 and June 2009 amendments on mandatory carriage of Electronic Chart Display and Information System (ECDIS) and Bridge Navigational Watch System also enforced in January 2011. The main objective of the SOLAS Convention is to specify minimum standards for the construction, equipment and operation of ships, compatible with their safety.

The "rules of the road" to be followed by ships and other vessels at sea are published in The International Regulations for Preventing Collisions at Sea 1972 (COLREGS) by the International Maritime Organization (IMO). Although rules for navigating vessels inland may differ, the international rules specify that they should be as closely in line with the international rules as possible. These rules apply to all vessels upon the high seas and in all waters connected therewith navigable by seagoing vessels. Traffic separation schemes may be adopted by the Organization for the purpose of these rules. (http://www.imo.org) A study on collision risk assessment for ships showed that efficient maritime navigation through dynamic obstruction at close range is still a serious issue faced by mariners. The study presents an alternative method of assessing the collision risk for surface ships in close-range encounters that is compliant with the COLREGs as well as other ships from different perspectives (Chee Kuang Tam and Bucknail , 2010,p. 257).

On the other hand the qualification standards for master, officers and watch personnel on seagoing merchant ships are set forth in the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (or STCW) which underwent significant amendments the most comprehensive revision of which was in 1993 where IMO established the highest practicable standards of competence to address the problem of human error as the major cause of maritime casualties (Hellmick and Glaskowsky Jr, 1995:283). The *1995 Amendments* provide that seafarers should be provided with "familiarization training" and "basic safety training" which includes basic fire fighting, elementary first aid, personal survival techniques, and personal safety and social responsibility. STCW, as amended, requires all training and assessment activities to be "continuously monitored through a quality standards system to ensure achievement of defined objectives, including those concerning the qualifications and experience of instructors and assessors" (http://www.imo.org).

At the Diplomatic Conference on June 21-25, 2010 major revisions were adopted to the International Convention on the Standards of Training, Certificate and Watchkeeping for Seafarers (STCW Convention) which ensured that the necessary global standards will be in place to train and certify seafarers to operate technologically advanced ships sometime to come. The amendments are known as the

"Manila Amendments to the STCW Convention and Code" and are set into force on January 1, 2012 (Revised STCW Convention, 2010).

Vessel Traffic Services and Vessel Traffic Management System

Vessel Traffic Services (VTS) are services implemented to improve the safety and efficiency of vessel traffic and to protect the environment. These are shore-side systems which range from the provision of simple information messages to ships, such as position of other traffic or meteorological hazard warnings, to extensive management of traffic within a port or waterway. Generally, ships entering a VTS area report to the authorities, usually by radio, and may be tracked by the VTS control centre. Governments may establish VTS when, in their opinion, the volume of traffic or the degree of risk justifies such services. (SOLAS Chapter V Safety of Navigation) IMO resolution A.578 (14) adopted the Guidelines for Vessel Traffic Services in 1985, which stated that VTS was particularly appropriate in the approaches and access channels of a port and in areas having high traffic density, movements of noxious or dangerous cargoes, navigational difficulties, narrow channels, or environmental sensitivity. The guidelines also made clear that decisions concerning effective navigation and maneuvering of the vessel remained with the ship's master. Revised guidelines for vessel traffic services, including Guidelines on Recruitment, Qualifications and Training of VTS Operators, were adopted as Assembly resolution A.857 (20) in November 1997 (Pachada, 2006).

Vessel Traffic Services were not specifically referred to in the International Convention for the Safety of Life at Sea (SOLAS) 1974, subsequent revisions adopted regulations which provide among others that Vessel traffic services (VTS) contribute to safety of life at sea, safety and efficiency of navigation and protection of the marine environment, adjacent shore areas, work sites and offshore installations from possible adverse effects of maritime traffic (http://www.imo.org). In compliance with the provisions of the International Maritime Organization (IMO) on the Safety of Navigation which mandates the establishment of the VTMS as a monitoring facility for marine vessel movement, the VTMS in the Philippines was created and implemented in July 2008 by virtue of PD no. 857 (Appendix A), also known as Revised Charter of the Philippine Ports Authority with the following

international documents as references: International Convention on Safety of Life at Sea (SOLAS), International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS) and International Ship and Port Facility Security (ISPS) Code.

The VTMS aims to a) enhance vessel traffic service of waterways b) ensure safety of navigation of vessels c) safeguard the security of vessels, facilities, individuals and their properties d) protect the marine environment of surrounding waters e) provide use of the Vessel Traffic Management System timely information and necessary assistance within the VTMS covered area. It covers all vessels approaching, entering, departing, navigating, operating or anchoring/mooring at the Batangas and Balayan Bays, and Verde Island Passage.

The VTMS installed at the Batangas Port is one of the two facilities installed in the country, the other one being at the Philippine Port Authority Port Area Manila. It is fully equipped with advanced technological equipment capable of monitoring and tracking vessels that enter the Batangas Bay. It has a control tower and four radar stations located strategically to cover the whole area of Batangas Bay, the north and south Verde Island passages where the Traffic Separation Scheme is located, the Maricaban Strait and Balayan Bay. The VTMS Control Center is equipped with consoles for monitoring of vessels and serves as the main operation center of the Vessel Traffic Management System (PMO-Batangas). It also utilizes a Close Circuit Television system (CCTV) that consists of CCTV camera, web encoder and CCTV monitoring display. All four radar stations have a CCTV camera for visual confirmation of vessels in addition to 60 other CCTV cameras installed in strategic areas of Phase I and II of the Port of Batangas (PMO Brochure). The implementing guidelines of the VTMS at the Batangas Base Port are contained in the Philippine Port authority Administrative Order No.1 s. 2008 which define very clearly the description and location of the VTMS control center and the radar stations that are strategically located within the Batangas Bay area specifying its latitudinal and longitudinal positions. Likewise, the system defines the Traffic Separation Scheme being utilized by the Batangas Port (POMO Brochure).

FRAMEWORK

The Traffic Separation Scheme (TSS) is a routeing system established by the Philippine Coast Guard in 1993 for vessels navigating along the north and south passes of the Verde Island, wherein the north pass is designated for exclusive use of west bound vessels while the south pass is for east bound vessels. It defines as well the anchorage grounds and fairway at Batangas Bay with clear definition of its coordinates in the north and in the east. The guidelines provide as well that all vessels are required to protect the marine environment and shall dispose of the vessel's generated wastes at the reception facilities ashore as provided for in PPA Administrative Order No. 02-2003 entitled "Implementing Guidelines on MARPOL 73/78 Requirement for Shore Reception Facilities" (Rule 17 – Environmental Protection). The Batangas Base Port charges all concerned vessels with appropriate fees (Rule 18 – Vessel Traffic Service Fees). Details of this rule are found in Appendix A.

Studies reviewed show that there is indeed a need to install the VTMS and establish Traffic Separation Scheme. For instance, the European Union (EU) has established an extensive vessel traffic monitoring and information system with a view to enhancing the safety and efficiency of maritime traffic. The information system is first and foremost the brainchild of the EU, but is also interlinked with several international conventions pertaining to the prevention of pollution and maritime security. The information system will be mandatory within the European Economic Area and will, therefore, concern maritime traffic in most European waters from the North Atlantic Ocean to the Black Sea (Hannesson, May 2008: p 351).

The establishment of a Naval VTS which combined voluntary VTS monitoring system with a traffic organization and information services was investigated by Sluiman and Koning (2010). The new naval concept aimed at providing military commanders responsible for maritime safety operations a level of vessel safety that makes security tasks easier to plan and perform. BY creating different scenarios such as terrorism in the Sunda Strait, piracy in the Gulf of Aden and terrorist threat in the Strait of Gibraltar. It was shown that the Naval VTS can enhance the safety of merchant marine shipping without

drawing upon the military assets, and enhance the safety of merchant ships transiting the Strait of Gibraltar without seriously reducing its throughput, requiring very few naval assets.

Likewise because of the dramatic changes in economic activities brought about by industrialization, Asian countries and other parts of the world such as Singapore, Hongkong, Taiwan and South Korea have developed export oriented marketing industries that resulted to increased demand for oil, increase in shipping traffic in the Straits and a change in composition of traffic passing through the Straits In the Middle East, there was an increase not only in the traditional tanker that carries coil produced in the Middle East, but also an increasing volume of reciprocal traffic bringing manufactured goods from East Asia countries to West Asia and beyond. . (Chua, 1993, Lee,1994, Naidu,1994 cited in Aguado 1999). Similarly, the maritime traffic in the Turkish Straits has been found to be exceptionally dense due to merchant traffic, coasters, fishing vessels and local traffic crossing the strait and causing difficulties in the navigation of the transit passage. Such dense traffic includes the transport of noxious, dangerous and hazardous cargo (oil, LNG, LPG, chemicals and other explosive and environmentally hazardous substances). This has resulted to the introduction of the Regulations by the Turkish authorities and the establishment of the 'Traffic Separation Schemes in the Straits, in accordance with the provisions of 'International Regulation for Prevention of Collision at Sea (Basar, 2009). Previous studies show that accidents with RoPax vessels have far reaching consequences both for economical and human life. To identify hazards related to casualties of RoPax vessels, models of accident scenarios involving RoPax vessels were drawn by Antao and Soares (2010).The study focused on identification of the basic events that can lead to an accident and the performance requirements.

Accidents at sea outside the Batangas area and elsewhere have been recorded to involve collision and grounding, where large vessels were more prone to grounding. A passenger / cargo vessel (MV Georich) ran aground on May 17, 2010 at two nautical miles off Sta. Monica Beach Banilad in Dumaguete City. Said vessel was carrying 422 passengers and 2 rolling cargoes when it encountered engine trouble. It sailed back to its post of origin to conduct repair and was able to safely disembark all its passengers. Similarly a Korean Yacht ran aground in La Union

on May 17, 2010. Said yacht was enroute to Korea when it took shelter at San Fernando Port due to rough seas and big waves (Buhay Marino, 2010).

These accidents have been attributed to navigational hazard, topography, currents and tides in the Straits and human error. More than 35 percent of the accidents are collisions which according to Lee (1994, in Aguado 1999) could be attributed to a large number of vessels using the Malacca Straits. Aguado cited three major accidents that have occurred within Batangas Bay since 1995. These include – MV san Lorenzo Ruiz at Matuco Point on May 2, 1995; MT Crane North at Anchorage on July 19, 1995; MV Maria Pamela at Ramp 8 Batangas Port on February 13, 1998. All these accidents resulted to substantial damages, either to the vessel, properties or loss of lives.

In the Philippines, an analysis of the current state of marine traffic in Batangas Bay showed that there were peak and lean months for ship calls, cargoes and passengers embarked and disembarked. Trend analysis over the eleven-year period showed that the number of vessels calling at Batangas Port continuously increased, as well as passengers and cargoes, with the proportion of foreign to domestic cargoes dominating in the last two years. Ship calls, cargoes and passengers are expected to increase significantly within the next years. Aguado (1999) projected that by 2010 the projected marine traffic would be 33,923 ship calls, 1,378,522 cargoes and 4,257,000 passengers. He also found that accident oil spills normally result from routine operations such as loading, discharging and bunkering in ports or at oil terminals and are normally small i.e. less than 50 barrels (7,950L), and that intermediate spills of 50 to 5,000 barrels (795,000L) are most likely to occur in ports, terminals during routine oil transfer operations such as loading, discharging and bunkering which are typically caused by hose valve failures and overfilling of task. These types of spills have resulted to low energy collisions, grounding and berthing accidents within port. Additionally, it was reported by Seaway Shipping Digest (2010) that there was a dramatic increase in foreign cargoes (78,595 mmt) which may be attributed to substantial increase in volume of cargoes handled by the Port Management Office (PMO) in Nasipit, Pulupandan, Batangas and Calapan, specifically of export products which are in demand in foreign markets. These products are sugar, molasses, limestone, nickel ores, scrap metals, cement, transport

equipment and agriculture products. The same report stated that cargo throughput posts moderate growth of 3.38 percent to 150,732 million metric tons last year from 145 million metric tons in 2008. This was attributed to the substantial improvement in exports in the last two months of 2009. According to a report from the Philippine Ports Authority, both the domestic and foreign cargoes handled in 2009 improved.

These and many other economic activities taking place around the globe require an efficient maritime traffic system that necessitates the establishment of a vessel traffic management system.

OBJECTIVES OF THE STUDY

This paper assesses the status of implementation of the Vessel Traffic Management System (VTMS) at the Batangas Base Port in terms of marine traffic in Batangas Bay with respect to ship calls of domestic and foreign vessels, cargoes, and passengers, marine hazards evident at the Batangas Bay Area in terms of shipping accidents and oil spills that have occurred during the period of the study and the compliance of vessels with the rules of the VTMS and subsequent imposition of penalty fees for non-compliance. Finally the study submits recommendations that will enhance the vessel traffic services at the Batangas Base Port.

MATERIALS AND METHODS

The study utilized the descriptive method of research specifically documentary analysis. The data on ship calls, cargoes and passengers traffic from 2001 to 2009 was retrieved from the Statistics Office of the Philippine Port Authority – PMO Batangas and was interpreted using mean. The data on marine accidents and oil spills were obtained from the office of the Philippine Coast Guard Region IV-A, while the data on compliance with the Vessel Traffic Management System were obtained from the VTMS Control Tower PMO Batangas and were analyzed using frequency, sum, and percentage. Personal interview was done with the management of the Philippine Ports Authority – PMO Batangas Port Management Services Division.

RESULTS AND DISCUSSION

State of Marine Traffic in Batangas Bay

Marine traffic in Batangas Bay is described in terms of the number of ship calls that consist of domestic and foreign vessels, volumes of cargoes, and number of passengers who embark and disembark at the Batangas Base port as well as the private ports located within the Batangas Bay.

Figure 1 shows the state of marine traffic in terms of the domestic and foreign vessels that call at the Batangas Baseport. It shows a total of 259,689 foreign and domestic vessels or a mean of 28,854 with the highest posted in 2009. Domestic vessels dominated the ship calls during the nine-year period at an average of 27, 895 vessels while foreign vessels had an average of 959 or 3.32 % of total ship calls. This finding corroborates Aguado's (1999) study which also found that there were more domestic vessels than foreign vessels that called at the Batangas Port during the period 1987 to 1997. The documents examined showed an increasing trend of ship calls at the Batangas Baseport and other private ports.

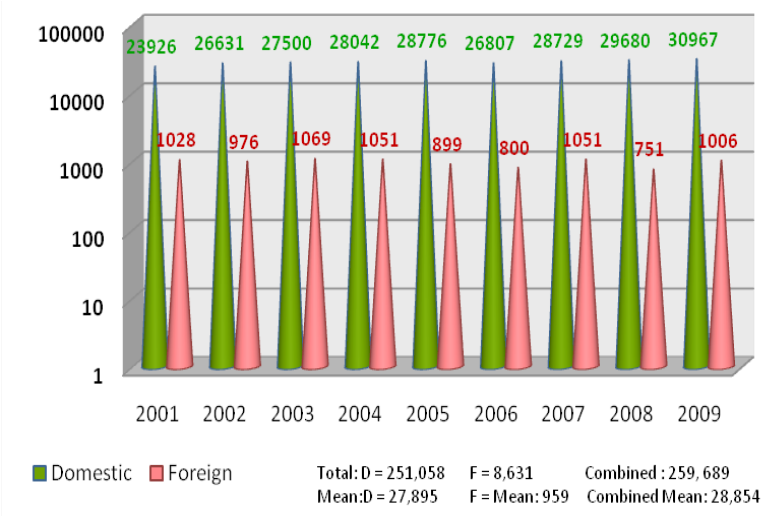


Figure 1. State of Marine Traffic in terms of SHIP CALLS

Figure 2 shows the state of marine traffic in terms of cargoes that entered the Batangas Bay during the nine-year period. It shows an average volume of cargoes estimated at 17,020,866 metric tons. Unlike ship calls, foreign cargoes dominated the cargo throughput during the period with a mean of 10, 561, 263 metric tons compared to the domestic cargoes which registered a mean of 6, 459, 603 metric tons or 38% of the total volume of cargoes. The average annual volume of cargo throughput was 17,020,866 metric tons. It is observed that the volume of cargoes that entered and left the Bay fluctuates with the highest proportion of foreign to domestic cargoes recorded in 2001 and 2004. These findings corroborate the recent report of Seaway Shipping Digest (2010) that there was dramatic increase in foreign cargoes (78,595_mmt) which may be attributed to substantial increase in volume of cargoes handled by the Port Management Office (PMO) in various seaports.

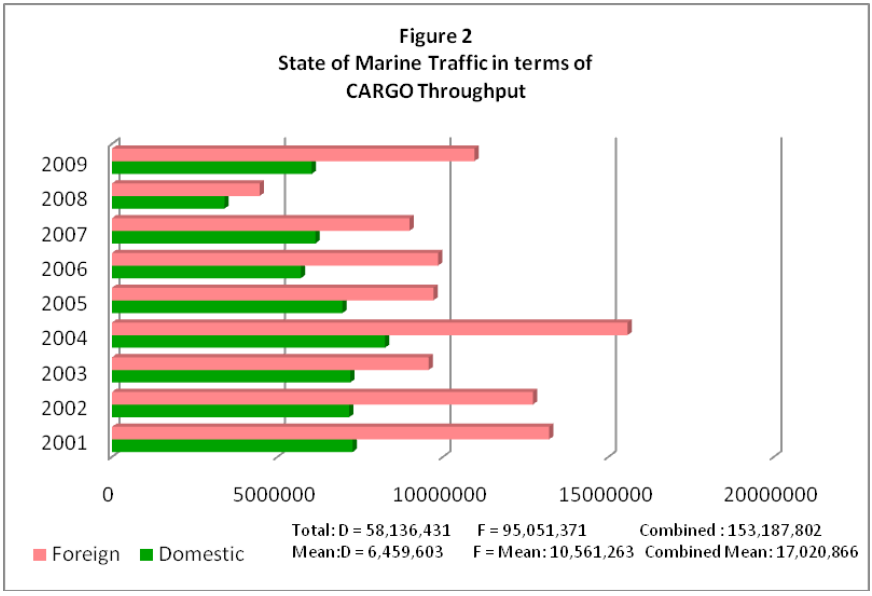
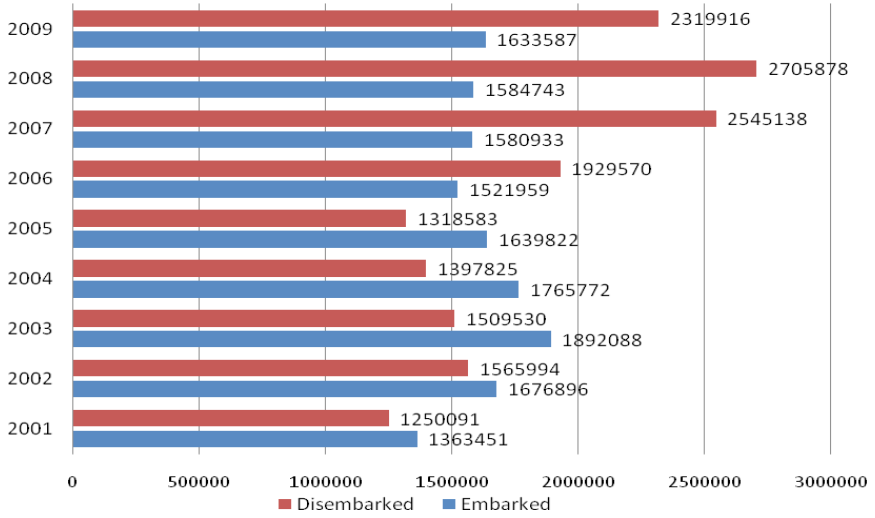


Figure 2. State of Marine Traffice in terms of CARGO Throughput

Figure 3 shows the state of marine traffic in terms of passengers that embarked and disembarked at the Batangas Baseport.



Total: D = 14,659,251 E = 16,542,525 Combined Total: 31,201,776
Mean: D = 1,628,806 E = 1,838,058 Combined Mean: 3,466,864

Figure 3. State of Marine Traffice in terms of Passengers

The average number of passengers per year that disembarked at the Batangas Base Port from 2001 to 2009 is 1,628,806 while those who embarked were registered at 1,838,058 passengers, giving an average of 3,466,864 for the total number of passengers. The records show that there is a fluctuating upward trend observed among the passengers who embarked and disembarked during the period under study.

On the whole the data show that in terms of ship calls, cargoes and passengers, there is an increasing trend in ship calls, cargoes and passengers which is indicative of the accelerating maritime trade and commerce in Batangas Province. It is interesting to note that the present records of shipcalls, cargoes and passengers surpass the projection of Aguado (1999).

Marine Hazards in Batangas Bay

Figure 4 shows the record of marine accidents at Batangas Bay. Since 2000 to 2010 there were nine major ship accidents most of which involved collision and grounding within the Batangas Bay Area.(Philippine Coast Guard, Region IV-A 2010).

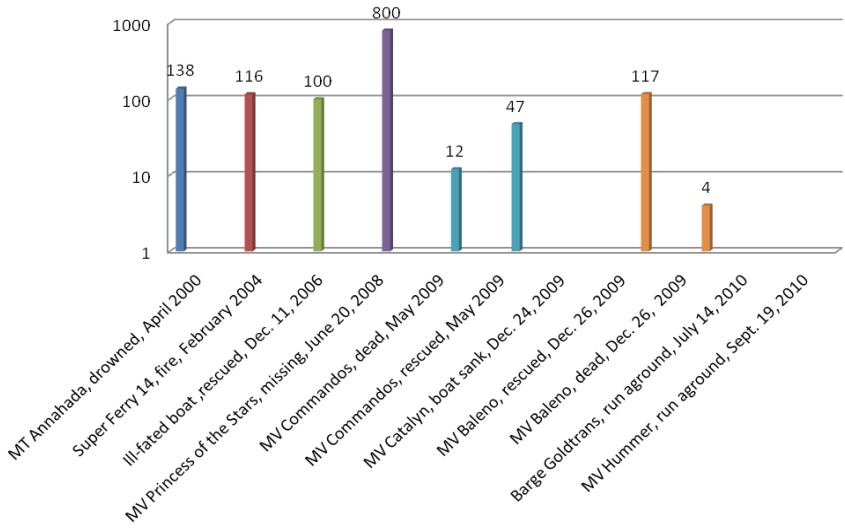


Figure 4. Marine Accidents in Batangas Bay 2000-2010

MT Annahada sank of Jolo Island in April 2000 where at least 138 drowned. Super Ferry 14 caught fire near Manila Bay in February 2004 that killed 116 people. Abu Sayyaf claimed responsibility, saying a suicide bomber sabotaged the boat to protest ill treatment of Muslim communities. An ill fated boat, while traversing the waters between the Malajibo-manok and Verde Island, was battered and tossed by big waves and capsized on December 11, 2006 where 100 persons were safely rescued. On June 20, 2008 MV Princess of the Stars sank 3km from Sibuyan Island in Romblon in typhoon-lashed seas that left around 800 people missing. MV Catalyn B sank in Limbones Island, Cavite on December 24, 2009 after it smashed into F/V Anatalia that was en route to Manila. December 26, 2009 the ill fated MV Baleno was involved in

one of the notorious tragedies where 117 were rescued and 4 bodies were recovered while sailing from Calapan City to Batangas City. On May 2009 twelve dead bodies were retrieved and forty seven were successfully rescued where MB Commandos sank. On July 14, 2010 Barge Goldtrans 306 about 500 meters away from Kuala Beach resort located in Nasugbu, Batangas was grounded. MV Hummer-H1 with GT 1,454.32 NT 988.94 aground at vicinity .5NM Tanagan, Calatagan, Batangas on September 19, 2010.

The data on spill incidents are shown in Figure 5. The data reveal that most incidents involved oil products of manufacturing companies or cargo ships. These are fuel oil, used oil, coco oil, soya oil, bunker oil, diesel or oily mixtures. The quantity of spills range from 5L to 1,200MT or 1,200,000 Liters for those recorded. The biggest spill is sulfuric acid in San Miguel, Bauan in 2006 at 1,200,000L followed by oily mixtures in Batangas City at 17,777.05L on various dates and diesel in 2008 at 16,000L at Taysan, Batangas. Caustic soda at 15,000L and used oil at 220 L are posted in 2003 also in San Miguel, Bauan. The other spills occurred in Tabangao and Sta. Clara, Batangas City where incidents of minimal counts were recorded. There are 11 incidents with undetermined quantity of spills including two incidents that occurred outside Batangas province (Pagbilao, Quezon and Romblon). These incidents maybe attributed to the fact that San Miguel, Tabangao, and Sta Clara are coastal barangays of Bauan and Batangaas City which constitute the industrial zone where manufacturing companies such as Keppel Shipyard, Mabuhay Vinyl Corporation, United Cocochem Shell Pilipinas and General Milling Corporation, among others are located. These manufacturing companies turn out to be the sources of oil spill (Phil Coast Guard, Region IVA).

Status of Implementation of the Vessel Traffic Management System

The status of implementation of the Vessel Traffic Management System shown in Figure 7 in terms of compliance with the various rules provided by PPA Administrative Order No. 1 s. 2008 show that there were 339 incidents of non-compliance incurred by different vessels that entered or departed Batangas Bay during the period 2009 to 2010. The most frequently violated provisions are those that dealt with

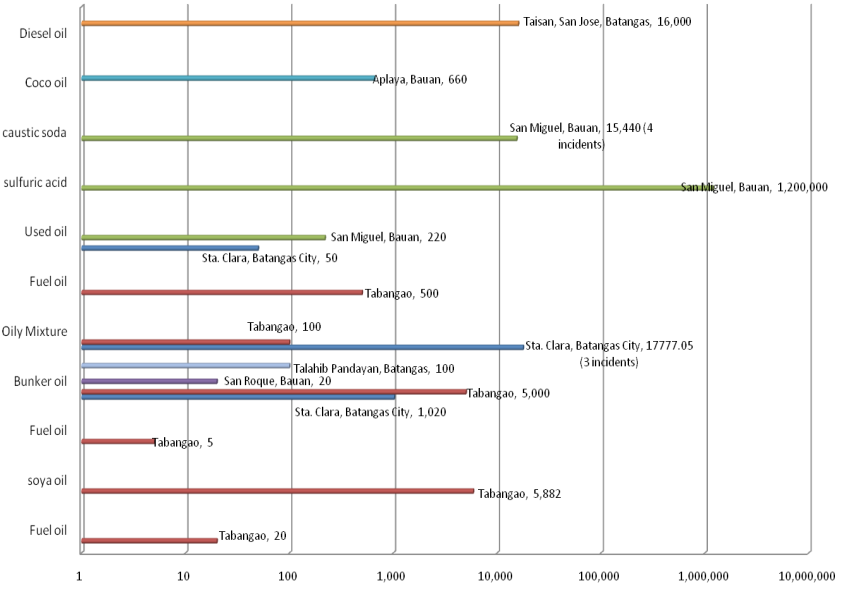


Figure 5. Quantity in Liters and Nature of Spill in Batangas Province

radio watch, Rule 13, 29% or 99 cases; monitoring VHF Channel all the time Rule 11.3, 27% or 93 cases; reporting procedure, specifically on approaching Batangas Bay Rule 10.1, 25% or 83 cases and reporting to Vessel Traffic Management System Control Center when berth shifting Rule 10.3 or 36 cases. There were minimal violations of other rules.

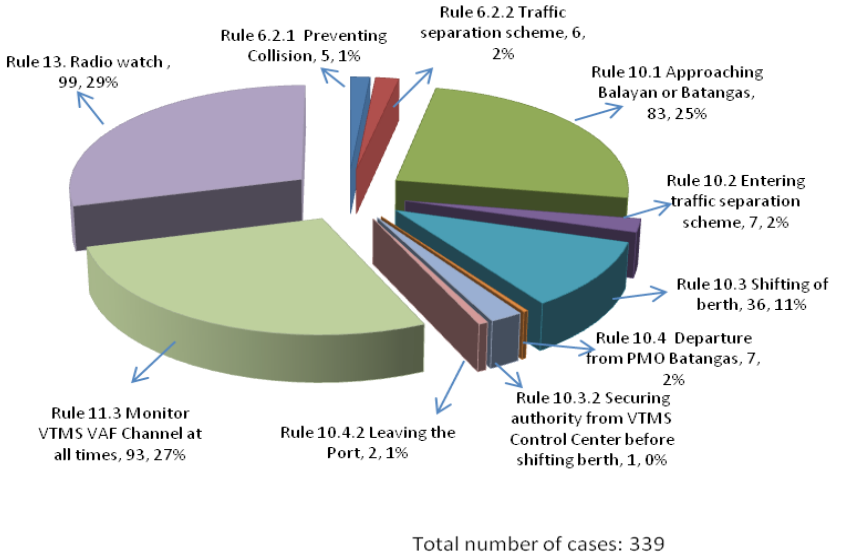


Figure 6. Most Frequently Violated Rules of VTMS

These findings reveal that vessels failed to keep radio watch or respond promptly to Vessel Traffic Management System Control Center when their attention was called. The rule on Radio Watch states that all vessels navigating, anchoring, berthing, or operating in the VTMS covered areas shall, at all times, keep radio watch on channel 16 and shall respond promptly when their attention is called. The second most frequent violated provision was the failure of vessels to monitor VTMS VHF Channel at all times. Similarly most vessels failed to give an arrival report or failed to report to VTMS Control Center complete vessel information when shifting berth. It is noted that there were only 11 cases of violation against the Traffic Separation Scheme, Rule 6.2.2, 20% where vessels involved counter flowed the North Pass or north bound vessels despite advice from VTMS to change course. Securing authority from VTMS Control Center before shifting berth, Rule 10.3.2 registered only one non compliance report and is considered the least violated at one percent. Failure to contact the Control Center when leaving the port, Rule 10.4.2 as the second least violated. Observance

of the rules for preventing collisions posted only five incidents of non compliance while failure to report to Control Center prior to entering the traffic separation scheme, Rule 10.2 and departure from PMO Batangas, Rule 10.4 had each seven violation reports. These findings are indicative of the efforts of the vessels to comply with the rules on International Regulations for Preventing Collisions at Sea 1972 (COLREGs) and other local and international regulations with respect to collision prevention.

It is important to note that there was no report of non-compliance with the rule on environmental protection which states that all vessels are required to protect the marine environment and shall dispose of the vessel's generated wastes at the reception facilities ashore.(PPA Adm. Order No.2 s.2003). This corroborates the report of the Philippine Coast Guard that in 2009 up to 2010 there are no reports on spill incidents.

The status of implementation of the VTMS since it was implemented in 2008, shown in Figure 7

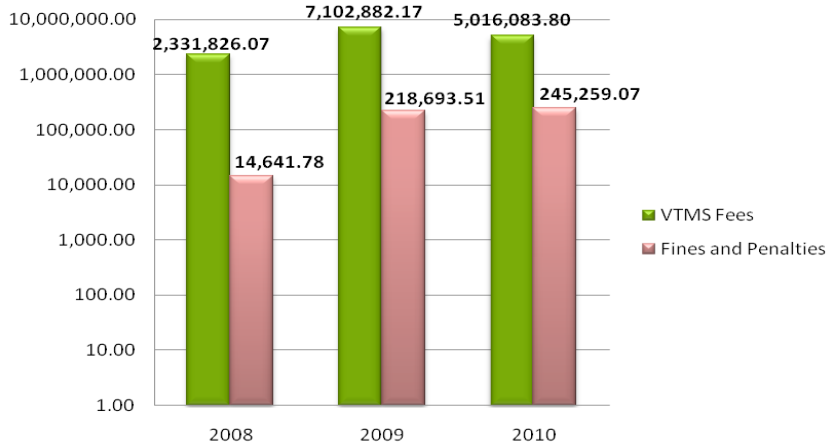


Figure 7. Status of Implementation of VTMS in terms of Fees, Collection and Penalties

The data show a collection of fees amounting to P2, 331,826.07 with a 204.6% increase in 2009 equivalent to P7, 102,822.17. The first two quarters of 2010 recorded an income from VTMS collection

fees amounting to P5, 016,083.80. In terms of fines and penalties, P14, 641.78 was collected in 2008 but it jumped to P218, 693.51 or 1,393.6% in 2009. As of August 2010, there is already a posted penalty fee amounting to P245, 259.07. These findings are indicative of the effective implementation of the Vessel Traffic Management System by the Philippine Port Authority Port Management Office in Batangas.

CONCLUSIONS

Heavy marine traffic is observed during the period covered by the study. Over the nine-year period the number of vessels calling at the Batangas Base Port and the other private ports within the Batangas Bay area as well as the volume of cargoes and the passengers who embark and disembark at the major port generally increased. Most marine accidents involve collisions and grounding while spill incidents were mainly oil or oil products of small manufacturing companies, cargo ships or tankers. The quantity of spills is relatively small compared to world record of oil spills. There is an effective implementation of the Vessel Traffic Management System at the Batangas BasePort evidenced by the vessels' compliance with the Traffic Separation Scheme. It has contributed to the enforcement of port regulations and the protection of the marine environment. The reasons of non-compliance are generally minor in nature which requires minimal penalty fees.

RECOMMENDATIONS

The study recommends that to enhance the vessel traffic services in the Batangas Bay being provided by the Batangas Base Port the PMO personnel may undergo, after appropriate needs analysis, continuous training and development to ensure that the VTMS Center is equipped with adequately skilled manpower that can operate the equipment with the highest efficiency. That will give the PPA PMO Batangas a competitive advantage over other suppliers in the maritime industry. .Moreover, changes in technology are so fast that management should have a regular updating and upgrading of their facilities and equipment as well as the installation of a regular preventive maintenance plan which will help prevent potential non-conformances and minimize

risks and wastage of resources. Furthermore, PMO may consider requiring the installation of a monitoring gadget for monitoring and tracking of all vessels including small fishing boats and the like. Future researchers may do a similar investigation considering other variables not covered in this study after another ten-year period. They may also look into the training needs of the Vessel Traffic Management System personnel to propose a training program that will address identified needs.

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