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CHAPTER TWO INTERNATIONAL LAW AND THE STRAITS OF MALACCA 2.1 INTRODUCTION This Chapter deals with an overview of the current status of the Straits of Malacca (the Straits) in terms of the increasing number, types and carriage of vessels passing through the congested waterway in particular vessels carrying hazardous and noxious substances (HNS) and the significance of the Straits of Malacca to Malaysia. H.M.Ibrahim pointed out that more than 60 % of these ships transported HNS. 1 Seven (7) important aspects of the Straits are analysed in this chapter: (i) legal status; (ii) general shipping statistics and available HNS statistics in the three major federal ports along the Straits, namely Port Klang, 2 Penang Port and the Johore Port bordering the Strait of Johore; (iii) shipping accidents; (iv) importance and usefulness of the Straits to Malaysia; (v) marine pollution; (vi) finances and (vii) weaknesses of the present regime in international law and way forward. 2.2 THE STRAITS OF MALACCA At the outset, the term "Straits of Malacca" needs some definitional clarification for some refer to "The Malacca Straits" when referring to the Straits of Malacca and Singapore. According to George, the Straits of Malacca and Singapore comprise five straits, namely: the

1 **Strait of Malacca; the Strait of Johor; the**

Strait of Bengkali; the Strait of Rupart and the Strait of Singapore. 3 The Straits of Malacca is located between the west coast of Peninsular 1 H.M.Ibrahim, "Straits safety not just littoral states' burden", New

Straits Times, 25 November 2008, 22. 2 The Port Klang has trade connections with over 120 countries and dealings with more than 500 ports around the world. Its ideal geographical location makes it the first port of call for ships on the eastbound leg and the last port of call on the westbound leg of the Far East-Europe trade route. <http://www.pka.gov.my>, 16 June 2009. 3 George, Mary, "Adequacy of Strait States Laws for the Control of Marine Pollution in the Straits of Malacca and Singapore", (2001) Asia Pacific Journal Of Environmental Law, Vol 6, Issue ¾, 241-295. Malaysia and the east coast of the island of Sumatra in Indonesia. 4 The Strait of Johore lies to the south of Peninsular Malaysia. 5 The Strait of Bengkalis lies between the islands of Bengkalis and Sumatra and the Strait of Rupat lies between Rupat and Sumatra. 6 The Strait of Singapore is located to the south of the island of Singapore and stretches to the south-eastern tip of Peninsular Malaya and to the north of the Indonesian island of Riau. 7 According to Hamzah, the Straits is approximately 451.9 nautical miles in length and varies in width from 173.8 nautical miles in the north to 11 9.6 nautical miles at the southern extremity. 8 The Straits of Malacca is defined as the area lying between the west coasts of Thailand and Malaysia on the Northeast, and the coast of Sumatra on the Southwest between the following limits: 9 On the Northwest: A line from Ujung Baka (Pedro punt) (5° 40' N, 95° 26' E), the Northwest extremity of Sumatra, to Laem Phra Chao (7° 45' N, 98° 18' E), the South extremity of Ko Phukit, Thailand. On the Southeast: A line from Tanjung Piai (1° 16' N, 103° 31' E), the South extremity of Malaysia, to: Pulau Iyu Kecil (1° 11' N, 103° 21' E), thence to: Pulau Karimun Kecil (1° 10' N, 103° 23' E), thence to: Tanjung Kedabu (1° 06' N, 102° 59' E). The width at its entrance in the north is about 126 nautical miles, namely between Tanjung Tamiang, Indonesia and Penang Island, Malaysia, and at the south end at the 4 George, Mary, "Adequacy of Strait States Laws for the Control of Marine Pollution in the Straits of Malacca and Singapore", (2001) Asia Pacific Journal Of Environmental Law, Vol 6, Issue ¾, 241-295.. 5 Ibid. 6 Ibid. 7 Ibid. 8 Hamzah Ahmad, ed., The Straits of Malacca, International Co-Operation In Trade, Funding & Navigational Safety, (Petaling Jaya, Pelanduk Publication, 1997), at page 4. 9 Id at 1. narrowest part it is about 8 nautical miles. 10 The water depths within the shipping lane of the Straits of Malacca vary: 100 meters in the north-west approach, 11 more than 200 meters in the north, between 200 meters and 30 meters in the centre and less than 30 meters at the southern end. 12 This thesis uses the term "Straits of Malacca" to refer to the Strait of Malacca and the Strait of Johore. The Straits of Malacca considered the busiest waterway in the world represent a vital trade and communication link to the international shipping community connecting the Indian Ocean with the South China Sea and the Pacific Ocean. 13 There are no historic international agreements binding this waterway. 14 The Straits is among the most important international waterways since the 7 th century connecting the Indian Ocean to the Pacific Ocean, linking the major Asian economies of India, China, Japan, South Korea and ASEAN with the rest of the world. 15 The increase in international trade has resulted in a commensurate increase in the volume of commercial traffic through the Straits. 16 Sakurai points out that the Straits provides the shortest and the most valuable shipping lane for tankers trading between the Middle East and Far East Asia as well as container ships trading between the Mediterranean/ Europe and the South East Asia/ East Asia/ North Africa. 17 Apart from the Straits of Malacca, the other alternative but longer route is through the Lombok Strait, the Makassar Strait and the Celebes Sea. However, the Lombok Strait is used by the largest tankers from the Arabian Gulf to Japan because they do not meet the 3.5 10 Bernard Kent Sondakh, "National Sovereignty And Security In The Strait of Malacca" Conference On the Strait of Malacca: Building a Comprehensive Security Environment, (Kuala Lumpur, 11-13 October 2004). 11 George, Mary, loc. cit. 12 Forbes, Vivian Louis, "The Malacca Strait In The Context Of The ISPS Code", Conference On the Strait of Malacca: Building a Comprehensive Security Environment, (Kuala Lumpur, 11-13 October 2004). 13 George, Mary, "Legal Regime of the Straits of Malacca and Singapore" Kuala Lumpur: Lexis Nexis, 2008), at 4. 14 Ibid. 15 Maritime Institute of Malaysia, 24 August 2010, http://www.mima.gov.my/index.php?option=com_content&view=article&id=85&Itemid=88. 16 Ibid. 17 Toshiki Sakurai, "The Straits of Malacca And Challenges Ahead: Japan's Perspective", Conference On the Strait of Malacca: Building a Comprehensive Security Environment, (Kuala Lumpur, 11-13 October 2004). meter under-keel clearance 18 requirement, and by ore carriers from Western Australia. 19 It is estimated that only 28% use the Lombok and Makassar Straits, a poor substitute for the Straits of Malacca because it is a longer route and therefore costly. 20 The Indonesian Director of the Center for Southeast Asian Studies commented that the Lombok Straits is not a suitable substitute waterway for the Very Large Crude Carriers (VLCCs) mainly because it is near Bali, a popular tourist attraction in Indonesia and there are no facilities available in cases of casualty.

21 If the Straits of Malacca are blocked, nearly half of the world's fleet would be required to re-route around the Indonesian archipelago through the Lombok Strait, located between the islands of Bali and Lombok, or the Sunda Strait located between Java and Sumatera. 22 By using the Straits of Malacca instead of the Lombok Strait of Indonesia, super large tankers carrying crude oil from the Middle East to the Far East can save up to 1,600 kilometers (863.9 nautical miles) which comes about to three days sailing time. 23 A study on the impact of re-routing revealed that the re-routing of tankers to Japan could increase cost of doing business by US\$88 million for the said diversion. 24 Malaysia, Indonesia and Singapore border the Straits of Malacca and are hereinafter referred to as the strait States. The Straits are a national asset to Malaysia being of strategic, economic, and environmental significance. H.M.Ibrahim points out that the Straits of 18 Under Keel Clearance (UKC) is the minimum depth of water between bottom of ship and seabed. If there is more water under the bottom of the ship, therefore, there is less chance of grounding and provides for safer navigation. Based on the UKC compromise where Singapore suggested a 3 metre UKC and Malaysia and Indonesia suggested a 4 metre UKC, the states finally agreed to a 3.5 metre UKC. This navigational safety agreement is signed in 1977 by Malaysian, Indonesian, Singaporean foreign ministers ASEAN meeting in Manila 1977. 19 In Symposium On The Enhancement Of Safety Of Navigation And The Environmental Protection Of The Straits Of Malacca and Singapore, 13-14 March 2007 at Hotel Nikko, Kuala Lumpur, Malaysia, Dr B.A.Hamzah commented that because of the nature of the shallow strait, tankers should fulfill a 4 metre under-keel clearance and not 3.5 metres. 20 Bernard Kent Sondakh, "National Sovereignty And Security In The Strait of Malacca" Conference On the Strait of Malacca: Building a Comprehensive Security Environment, (Kuala Lumpur, 11-13 October 2004). 21 Prof. Dr. Hashim Djalal, Symposium On The Enhancement Of Safety Of Navigation And The Environmental Protection Of The Straits Of Malacca and Singapore, 13-14 March 2007 at Hotel Nikko, Kuala Lumpur, Malaysia. 22 Ho, Joshua, Institute of Defence and Strategic Studies, Singapore, The IMO-KL Meeting on the Straits of Malacca and Singapore, 5 October, 2006. 23 Ibid. 24 Ibid. Malacca is one of the worlds have recognized "mega biodiversity" regions. 25 This fact compels Malaysia, Indonesia and Singapore to be proactive in order to protect, for instance, the natural resources and beaches along the Straits from catastrophic HNS shipping accidents. Rickaby has identified various HNS ships and most of them are included in the Vessel Traffic System (VTS) at Port Klang. 26 Given the increase in the number of ships and the peculiar characteristics of the Straits 27 , the possibility of HNS vessel accidents occurring not only in specific areas 28 , but also within the busier shipping routes of the Straits is high. In 2008, 76,381 ships reported at the Klang Vessel Traffic Reporting System. As stressed by H.M.Ibrahim, more than 60 % of these ships as reported in 2008, transported hazardous and noxious cargo. It may be presumed that the HNS cargoes passed through the Straits of Malacca unnoticed and without any liability and compensation on HNS regime by the strait States. 25 H.M.Ibrahim, "Straits safety not just littoral states' burden", New Straits Times, 25 November 2008, 22). 26 Interview with Mr. Ahmad Nordin bin Ibrahim, Head of Vessel Traffic Services Unit, Marine Department of Malaysia, email interview on 18 May 2007. 27 Hamzah Ahmad, ed., The Straits of Malacca, International Co-Operation In Trade, Funding & Navigational Safety, (Petaling Jaya, Pelanduk Publication, 1997), at page 4. 28 The earliest and most catastrophic example of an HNS incident occurred in Texas City on April 16, 1947, when the ship SS Grandcamp, carrying explosive ammonium nitrate, caught fire and consequently exploded at the docks in Texas City. The entire dock area was destroyed, along with the nearby Monsanto Chemical Company, other smaller companies, grain warehouses, and numerous oil and chemical storage tanks. The ship SS High Flyer, in dock for repairs and also carrying ammonium nitrate, was ignited by the first explosion; it was towed 100 feet from the docks before it exploded early the next day. The exact number of people killed is unknown, although the ship's anchor monument records 576 persons known dead. The number of injured ranged in the thousands, and loss of property totaled about \$67 million. Litigation over the Texas City disaster was finally settled in 1962, when the United States Supreme Court refused to review an appeals court ruling that the Republic of France, owner of the Grandcamp, could not be held liable for any claims resulting from the explosion. The disaster brought changes in chemical manufacturing and new regulations for the bagging, handling and shipping of chemicals. More than 3,000 lawsuits involving the United States government, since the chemicals had originated in U.S ordinance plants, were resolved by 1956, when a special act passed by Congress settled all claims for a total of \$16.5 million 2.2.1 The natural characteristics of the Straits The physical peculiarity of the Straits along this narrow corridor increases the possibilities of accidents due to the heavy traffic. To reduce the number of accidents along this waterway, the Marine Electronic Highway

(MEH) Project Setting treats the Straits of Malacca and Singapore jointly as together they form the main seaway connecting the Indian Ocean (via the Andaman Sea) with the South China Sea. 29 According to MEH, the Straits, as it is also known and situated between Sumatra and the Malay Peninsula, are approximately 540 nautical miles long, 1619.9 nautical miles wide at the north-west entrance, and just 6.5 nautical miles at the south-east entrance. 30 According to Hamzah, the climate in the Straits of Malacca and Singapore is typically equatorial with uniform high temperature, high humidity and copious rainfall 31 and two main seasons: the Northeast Monsoon (occurs from late November to March) and the Southwest Monsoon (occurs from May to September). 32 Strong thunderstorms called "Sumatra's" may produce gusts of 40-50 knots or higher during the Southwest Monsoon. 33 There are dangerous banks composed of sand at the One Fathom Bank Traffic Separation Scheme and Fair Channel Bank. 34 Towards the south of Singapore, at its south-eastern exit, the topography and seabed are complex due to the presence of a large number of small islands and shoals. 35 29 The Marine Electronic Highway Project, Project Setting, The Straits of Malacca and Singapore, 12 August 2010, <<http://www.meh-project.com/setting>> . 30 Ibid. 31 Ahmad, Hamzah, ed., The Straits of Malacca, International Co-Operation In Trade, Funding & Navigational Safety, (Petaling Jaya, Pelanduk Publication, 1997), at page 6. 32 Ibid. 33 Ibid. 34 George, Mary, Legal Regime Of The Straits Of Malacca And Singapore, (Malaysia: Lexis Nexis 2008), at 7. 35 Ibid. The Straits has also witnessed some ship wrecks 36 which pose a threat to navigation. 37 A hydrographic survey within the Traffic Separation Scheme of the Straits of Malacca and Singapore shows that there are about eleven such wrecks, 38 see table below: 39 .

COORDINATES	BRIEF DESCRIPTION
Pyramid Shoal 2° 27' N; 101° 30' E	Sand, least depth 3.4m.; protrudes
Bambek Shoal 2° 33' N; 101° 40' E	Hard sand; least depth 0.3m; infamous for Portuguese and Dutch wrecks
Rob Roy Bank 1° 55' N; 102° 03' E	15 miles long sand ridge; least depth 2.1m
Karimum Islands & islets	WRECK/ SITE Nassau Diana Middleburg Sao Salvador

Table 2.1.1: European ship wreck sites in the Malacca Straits LOST/ (FOUND) 1606 (1993) 1817 (1993) 1606 (1993) 1606 (1993)

LOCATION	BRIEF COMMENT
Bambek Shoal Off Tanjung Bidara	Bambek Shoal VOC (Dutch East India Company) warship; archaeologically excavated, published, recovered artifacts sent to National Museum. British East India Co. country ship; excavated mainly for Chinese ceramics cargo.
Bambek Shoal	VOC (Dutch East India Company) warship; location identified from historical and magnetometer survey
Portuguese galleon	location identified from historical and magnetometer survey

36 Ship wrecks are also within the scope of the six projects addressed by the strait States in the Symposium On The Enhancement Of Safety Of Navigation And The Environmental Protection Of The Straits Of Malacca And Singapore. The critical wrecks identified and the project led by Malaysia that received contribution from India by providing courses for the three strait States at the Naval Hydrographic School in Goa 37 See Chapter Five (5) of this thesis on Sub-regional Management of HNS Shipping in the Straits of Malacca. 38 The Marine Electronic Highway (MEH) project has surveyors from GEMS Survey Limited and the MEH Project Oversight Team includes six hydrographers from Indonesia, Malaysia and Singapore The surveyors will use shallow-water multi-beam and side-scan sonar-technology to acquire accurate hydrographic survey data, including the location of any obstructions such as wrecks, covering an area of 621.28 square kilometers around the One Fathom Bank area, representing around 14 % of the total area of the TSS. See International Maritime Organisation, 24 August 2010, http://www.imo.org/Newsroom/mainframe.asp?topic_id=1859&doc_id=12540 39 International Maritime Organisation, 24 August 2010, http://www.imo.org/Newsroom/mainframe.asp?topic_id=1859&doc_id=12540 Dom Duarte's Galleon Caroline Flor De La Mar Sao Simao Todos os Santos Erasmus Santa Cruz Nossa Senhora De Conceicao Santo Antonio Sao Nicolao 1606 (1993) 1816 (not found) 1511 (not found) 1606 The battle before Malacca after battle of Cape Rachado Bambek Shoal Bambek Shoal Northeast Sumatera Malacca waters Source: Bound, 1996; Brown & Sjostrand, 2002 Portuguese galleon; location identified from historical and magnetometer survey British East India Company country ship Portuguese carrack 40 ; the most popular yet elusive wreck despite intensive search A mixture of Portuguese carracks and galleons; based on historical accounts from the battle of Cape Rachado and the battle before the fall of Malacca into Dutch hands. Many wrecks were either destroyed by the Dutch warships or self-destroyed by setting on fire to avoid falling into Dutch hands. To enhance the safety of navigation in the Straits, traffic separation schemes 41 have been established off One Fathom Bank and in the Northwest approach to the Singapore straits. There is no routing system between these two schemes. Apart from traffic separation schemes, other navigational aids available in the Straits are the International

Buoyage System 42 , the light house 43 , racon 44 , beacon 45 , ramark 46 , Vessel Traffic 40 Carrack means galleon (a large square-rigged sailing ship with three or more masts; used by the Spanish for commerce and war from the 15 th to 18 th centuries) <http://www.audioenglish.net/dictionary/carrack.htm>. 17 September 2010, 3.00 pm. 41 "Traffic Separation Scheme" (TSS) means an imaginary shipping lanes provided in the navigation chart to guide the vessel proceeding in the appropriate traffic lane following in the general direction of traffic flow. TSS is to improve the navigation in the areas where traffic density is high or traffic movement is restricted and avoid head on situation. The Straits of Malacca has the longest TSS in the world. It starts from about 10 nautical miles northwest of One Fathom Bank Lt Ho and ends at about 5 nautical miles east of Horsburg LH.Ho. 42 "The International Buoyage System" means port and starboard hand buoy, special marks, isolated danger marks, safe water marks and cardinal marks (north, south, east and west) etc. 43 "The light house" means which provides One Fathom Bank Lt. Ho, Jugra Lt.Ho, Cape Rachdo Lt. Ho and Tanjung Piai Lt. Ho. 44 "Racon" means a device that on receiving radar signal, transmits coded signal so that its position can be exactly identified among the many echoes in the vicinity. 45 "Becon" means a fixed device which sends or receives, amplifies, alters and returns a radar signal permitting a distant receiver to determine it bearing and range.. 46 "Ramack" means a type of radar beacon occasionally used to mark maritime navigational hazard. The word is an acronym for radar marker. Transmit either continuously on the radar bands. The transmission forms a line on a plan position indicator radar display. Ramarks are less commonly used compared to racon which give the location as well as the bearing hazard and do not clutter the display so much. System 47 and the Strait Reporting System. 48 Risk of collision is appreciable due to heavy traffic using the through routes and frequent crossing traffic and fishing crafts with nets. The Straits fringes the most developed sections of the Malaysian coastline and numerous small islands that line the strait. 49 The said islands are Pulau Jarak, Pulau Perak and the Pulau Sembilan Group of Islands. 2.3 LEGAL STATUS Malaysia ratified the 1982 LOSC on 14 October 1996 and in fulfilling some of the obligations under the 1982 LOSC, the 2009 Continental Shelf (Amendment) Act and the 1984 Exclusive Economic Zone are used. To a geographer, a strait is a narrow passage connecting two sections of the high sea. 50 Bruel defines a geographical strait as a contracted narrow sea being of limited breadth between two land territories which connects two other seas. 51 According to George, there are two issues regarding straits: firstly the geographical strait, natural water way, is a narrow corridor which lies between areas of land, subject to a rule of law that connects the 47 "Vessel Traffic System' means Vessel entering the Straits is mandatory to call the Vessel Traffic System authority on VHF channel to report information required by the VTS control such as vessel name, call sign, IMO number, position, course, speed and etc. In the Straits there are 6 sectors controlled by Klang VTS and Johor VTS. The movement of the vessels along the Straits is being monitored by radar surveillance where the radar scanners are located at various places along the straits. 48 "Strait Reporting System" means straitrep is a mandatory ship reporting system under SOLAS regulation V/11. The objective of straitrep is to enhance the safety of navigation, to protect the marine environment, to facilitate the movement of vessels and to support search and rescue and oil pollution response operations. The operational area of straitrep covers the Straits of Malacca and Singapore between longitude 100 deg 40min E and 104 deg 23 min E, the area is divided into 9 sectors and each has an assigned vhf channel and a VTS authority(sector 1 to 5 Klang VTS, sector 6 Johor VTS and sector 7 to 9 Singapore VTS). The call to the appropriate VTS authority should be made on vhf channel assigned to that particular sector in which the vessel located. Straitrep also provided information to vessel about specific and critical situation which could cause conflicting traffic movement, and other information concerning safety of navigation. Vessel is required to maintain a listening watch on the appropriate sector VHF Channel. 49 Siew-Moi Phang, Azhar Hashim & others, UMMREc Expedition to the Lesser Known Islands in the Straits of Malacca: Pulau Jarak, Pulau Perak and Pulau Sembilan Group of Islands, The Straits of Malacca: Building a Comprehensive Security Environment, (Kuala Lumpur, 11-13 October 2004). 50 George, Mary, Legal Regime of the Straits of Malacca and Singapore, (Malaysia: Lexis Nexis, 2008) at 25. 51 Id at 27 high seas

1 **used for international navigation.** 52 Secondly, there **is a** guarantee **of**

safe and uninterrupted passage through the strait. 53 The

1 International Court of Justice in the Corfu Channel Case

in 1949 decided on the status of straits used for international navigation. 54 The question was whether there was acceptance of an international custom that recognized the right of innocent passage for warships during peace time (incident happened after World War II), without the previous authorization of the coastal state, through the Corfu Channel (as a strait connecting two parts of the high seas). 55 One of the issues involved was whether the Corfu Channel constituted an international strait or not. 56 As to whether the Corfu Channel constituted an international strait or not the decisive criterion according to the ICJ was its geographical position connecting two parts of the high seas and its function of being used for international navigation. Of all the following criteria that were relevant to an international strait, namely: 57 i) it was of great navigational importance; ii) the volume of traffic was high; iii) the traffic was international, national or mixed; iv) the strait was the only route; v) the strait was the necessary route; vi) the strait was the alternative route and the vii) the strait was a useful route. The Straits of Malacca fall within the definition of a strait used for international navigation in Part III of the 1982 Law of the Sea Convention (1982 LOSC) under Article 52 Ibid. 53 Ibid. 54 Ibid. 55 Id at 28. 56 Ibid. 57 George, Mary, Legal Regime of the Straits of Malacca and Singapore, (Malaysia: Lexis Nexis, 2008) at 25. 41 37 as it connects one part of the high seas or an exclusive economic zone with another part of the high seas or an exclusive economic zone. The regime of transit passage prevails in such straits unlike the regime of innocent passage that prevails in territorial seas. Subject to certain resource rights, the

1 transit passage regime implies that the strait is no longer to be considered as part of the territorial sea,

and that the

1 coastal State powers in the strait are different from those in the territorial sea.

58 The immediate

1 implication of the transit passage regime for all strait States is that user States have unlimited and maximized freedom of passage. Strait States shall under the provisions of Article 44 give appropriate publicity to any danger to navigation or overflight within or over the strait of which they have knowledge. 59 To minimize the number of accidents and to enhance the safety of navigation, strait States have the right to prescribe sea lanes and traffic separation schemes that conform to international

organizations and which are duly publicized on charts as stated in Article 41. 60 To this end,

1 strait States have to adopt, enforce and publicise municipal laws and regulations

under Article 41 and Article 42 that: 61 i) provide safe navigation and regulate maritime traffic; ii)

1 implement and give effect to international marine pollution conventions;
 iii) **apply international regulations in municipal laws for the control of pollution by**

oil and noxious substances; iv) harmonise

1 national legislation of strait States such as Malaysia, Indonesia and Singapore with the provisions of the 1982 LOSC;

and v)

1 deal with the loading and unloading of any commodity, currency or person.

58 Id at 56. 59 George, Mary, Legal Regime of the Straits of Malacca and Singapore, (Malaysia: Lexis Nexis, 2008) at 25. 60 Ibid. 61 Ibid. Strait States are required to

1 draft and enforce laws and regulations that do not hamper, deny, discriminate, impair or impede transit passage rights. 62 Strait States

should realise that the standard of responsibility remains undefined where international responsibility is to be

1 borne by the flag State and State of registry of the

aircraft for violation of strait State laws as outlined above (on maritime traffic, pollution control, fishing vessels, fishing, loading or unloading of any commodity, currency or person). 63

1 Strait States have no right of enforcement against foreign flag ships for breach of compliance with national laws and regulations.

64 In situations of distress, or where force majeure applies ships and aircraft should not delay, threaten or actually use force against strait States and carry out any activity outside their mode of transit. 65

1 Strait States, however, have the right to give effect to international regulations on discharge of oil and oily wastes and other noxious substances in the strait through municipal regulations.

66 This provision shows that the strait States are bound to ratify and apply international regulations regarding noxious substances in the strait. In other words, the strait states bordering the Straits of Malacca are not allowed to implement regulations as they think suitable by looking at the nature of the Straits of Malacca. This means that the strait States have no say or influence in implementing the strait's regulations on hazardous and noxious substances which are actually the said sea area which also constitutes their

"territorial sea". The strait states have the same as international standard or lower standard if referring to the actual status of the water in the Straits of Malacca, the "territorial sea" of Malaysia and Indonesia. 2.3.1 HNS in Part III, the 1982 LOSC 62 Id at 56. 63 Id at 57. 64 Ibid. 65 Ibid. 66 Id at 25. There are no provisions regulating HNS shipping in Part III. However, there are many international conventions related to HNS shipping adopted by the International Maritime Organisation (IMO) for safety of navigation, control of marine pollution, liability and compensation, regional response action plans, and regulation of chemical wastes that strait States can enforce provided they are contracting parties. Unfortunately, the 1996 HNS Convention on liability and compensation for HNS pollution and its 2010 HNS Convention Protocol are not in force yet. Malaysia has not ratified this convention and consequently, has no obligation to incorporate its rules and standards into municipal law except to the extent that the rules represent customary international law or that such international rules and standards are necessary for the protection and preservation of the marine environment. Unlike Part III, HNS shipping is regulated in Part II, Section 3, on Territorial seas in Articles Article 22 and 23. Article 22 states that "the coastal State where necessary having regard to the safety of navigation, require foreign ships

1 **exercising the right of innocent passage through its territorial**

sea to use such

1 **sea lanes and traffic separation schemes**

as it may designate or prescribe for the regulation of the passage of ships. In particular, tankers, nuclear-powered ships and ships carrying nuclear or other inherently dangerous or noxious substances or materials may be required to confine their passage to such sea-lanes." Article 23 stipulates that "Foreign nuclear-powered ships and ships carrying nuclear or other inherently dangerous or noxious substances shall, when exercising the right of innocent passage through the territorial sea, carry documents and observe special precautionary measures established for such ships by international agreements." Part III is silent on the provisions of HNS shipment in the Straits of Malacca, strait

1 **used for international navigation. The** missing provision **on**

HNS shipment

1 **in Part III of the 1982 LOSC**

will burden and lead to disadvantage side to the strait States. Basically, the general obligations and duties of the strait States are well stated in Part III, straits used for international navigation and these duties are well implemented by the strait States. The provisions stated in

1 **Part III, the 1982 Law of the Sea Convention**

have imposed many obligations and duties on the strait States when compared to the navigational

1 **rights and duties of the user states** within the **strait.**

Article 233 67 and

1 Part XII of the 1982 LOSC empower strait States with

the necessary jurisdiction for the elimination and control of marine pollution. It has already been demonstrated elsewhere that "when Part III, Article 233 and Part XII of the 1982 LOSC are read together, they seem to be inconsistent with each other and create uncertainty as to whether strait States can have the same powers as the coastal States in their territorial sea, or if not the same set of powers, then powers mutatis mutandis under their specific status as straits States. There needs to be further clarity in defining the scope and efficacy of these jurisdictional powers in the control and elimination of marine pollution from the seas".⁶⁸ The chemical or HNS industry is worth billions of US dollars and given the vulnerability of the Strait to incidents of marine pollution, this thesis seeks to develop a national legal approach to regulate HNS shipping through the Straits.

2.4 SHIPPING STATISTICS

⁶⁷ George, Mary, *Legal Regime of the Straits of Malacca and Singapore*, (Malaysia: Lexis Nexis, 2008) at 25. ⁶⁸ *Id* at 57. An indication of HNS shipping in Malaysia may be gathered from general shipping statistics. The port authorities of Malaysia do not have actual HNS cargo statistics due to the secrecy of these commercial transactions. The current details of HNS shipping are derived from the nature of the ships calling at the ports as HNS can only be carried on specific ships. So the shipment of HNS is associated with and derived from the type of ship as reflected in the shipping statistics. There are many Malaysian ports within the Straits of Malacca, namely, Dermaga Tanjung Lembung, Teluk Ewa Jetty, Kuala Perlis, Penang Port, Lumut Port, Telok Intan, Port Klang, Port Dickson, Sungai Udang Port, Malacca Port, Muar and the Johore Ports comprising Johor, Tanjung Pelepas and Tanjung Langsat Port. Of these, HNS carrier details are available from Port Klang, Penang Port and the Johore Ports.

2.4.1 Port Klang Vessel Traffic System and Mandatory Ship Reporting System at Port Klang

The Vessel Traffic System (VTS) is divided into six (6) sectors controlled by the Klang VTS and Johore VTS which consist of Sector 1 located at Angsa, Sector 2 located at Jugra, Sector 3 located at Cape Rachado, Sector 4 located at Undan, Sector 5 located at Segenting and Sector 6 located at Piai. ⁶⁹ A VTS operated by Port Klang Authority was installed and commissioned in October 1999. ⁷⁰ This sub-section focuses on shipping traffic statistics that have been reported to the VTS at Port Klang. An examination of ⁶⁹ Lamri, Jaafar & Saidi, Halim, "Navigational Safety in the Straits of Malacca, An Assessment from the Bridge", Fifth MIMA Conference on the Straits of Malacca: Present and Future Perspectives, (Kuala Lumpur, 1-2 August 2006). The VTS centre is located on the 19 th Floor of the Westport Commercial Buiding, Pulau Indah - Notice 01/2000: Notice to Shipowners, Agents, Masters and Harbours Pilots, <http://www.pka.gov.my/Marine.asp> , 20/11/2009. The centre is served by a network of radars, VHF installations and vessel tracking and monitoring system. The control centre is operated 24 hours and is manned by competent staff with pilotage experience - Notice 01/2000: Notice to Shipowners, Agents, Masters and Harbours Pilots, <http://www.pka.gov.my/Marine.asp> , 20/11/2009. ⁷⁰ *Ibid*. these statistics is important as it shows the flow, pattern and ever increasing number of ships passing through the Straits. The Mandatory Ship Reporting Systems in the Straits of Malacca and Singapore ⁷¹ are based on Notice 01/2000 by the Port Klang Authority to shipowners, agents, masters and harbour pilot and it came into force on 1 st March 2000 for all vessels entering, leaving and navigating within the Pilotage District of Port Klang. ⁷² The aim of the reporting system is to ensure that the movement of traffic is monitored so as to enhance navigational safety within the waterway. ⁷³ In addition, traffic movements are also coordinated with proper planning and communication. ⁷⁴ Masters and Pilots are also provided with updated traffic and weather information. ⁷⁵ Categories of ships required to participate in the ship reporting system are: ⁷⁶ i) vessels of 300 gross tonnage (GT) and above; ii) vessels of 50 metre or more in length; iii) vessels engaged in towing or pushing with a combined GT of 300 and above, or with a combined length of 50 metres or more; iv) vessels of any tonnage carrying hazardous cargo, as defined in paragraph 1.4 of resolution Malaysia Shipping Circular (MSC).43(64); v) all passenger vessels that are fitted with Very High Frequency (VHF), regardless of length or GT; and vii) any category of vessels more than 50 metres in length or less than 300 GT which are fitted with VHF and in an emergency, uses the appropriate traffic lane or separation zone, in order to avoid immediate danger. ⁷⁷ The aim of the reporting system is to ensure ⁷¹ The Maritime Safety Committee, at its sixty-ninth session (11 to 20 May 1998), adopted in accordance with the provisions of Assembly resolution A.858 (20), and by the annexed resolution MSC.73(69), mandatory ship reporting systems in the Straits of

Malacca and Singapore. The mandatory ship reporting systems will enter into force at 0000 hours UTC on 1 December 1998. SN/Circ.201, 26 May 1998. 72 Notice 01/2000: Notice to Shipowners, Agents, Masters and Harbours Pilots, <http://www.pka.gov.my/Marine.asp> , 20/11/2009. 73 Ibid. 74 Ibid. 75 Ibid. 76 Ibid. 77 Ibid. that traffic movement is monitored to enhance navigational safety 78 and coordinated with proper planning and communication. Masters and Pilots are provided with updated traffic and weather information. 79 The definition of ship as follows: "Ship" is defined in Section 2, The Malaysia's Merchant Shipping Act 1994 as any sea-going vessel and any seaborne craft of any type whatsoever, actually carrying oil in bulk as cargo. "Ship" is defined in Section 2, Part VA under the heading of Malaysia's Pollution From Ships in The Merchant Shipping Ordinance, 1952 as a vessel of any type whatsoever operating in the marine environment and includes hydrofoil boats, air-cushioned vehicles, submersibles, floating crafts and fixed or floating platforms. "Ship" is defined in Section 2, the Malaysia's Environmental Quality Act 1974 (Act 127) as including every description of vessel or craft or floating structure. "Ship" according to the Section 2, the Malaysia Exclusive Economic Zone 1984 includes every description of ship or floating or submarine craft or structure. 78 Ibid. 79 Ibid. The procedures for reporting are as follows: Call : Port Klang Traffic VHF frequency : Ch12, Tel : 3011512, Faks : 3011510 Vessels should call PORT KLANG TRAFFIC ON Ch12, 2 hours before arrival and provide the following information: Name of vessel, radio call sign, LOA, GRT, Maximum draft, Last Port, Port of Entry Notice 01/2000: Notice to Shipowners, Agents, Masters and Harbours Pilots, <http://www.pka.gov.my/Marine.asp> , 20/11/2009. Departure- Vessels should call PORT KLANG TRAFFIC on Ch12, 15 minutes before departure and provide the following information: Name of vessel, Berth number, Point of Exit, Next Port Notice 01/2000: Notice to Shipowners, Agents, Masters and Harbours Pilots, <http://www.pka.gov.my/Marine.asp> , 20/11/2009. Movements within the Pilotage District- Vessels should call Port Klang Traffic on Ch12, 15 minutes before departure and provide the following information: Name of vessel, point of departure, destination Notice 01/2000: Notice to Shipowners, Agents, Masters and Harbours Pilots, <http://www.pka.gov.my/Marine.asp> , 20/11/2009. 48 "Ship" is defined in the Dictionary of Shipping Terms as a floating vessel which is self-propelled and capable of carrying cargo or passengers. 80 "Vessel" as stated in the Dictionary of Shipping Terms is a ship or boat. 81 The 1999-2006 statistics of the Port Klang VTS show an increase in the number of ships passing through the Straits. Various types of ships carrying HNS cargoes have called at Port Klang, including Very Large Crude Carriers or VLCCs, Liquid Natural Gas Carriers or LNG (Liquefied Natural Gas Carriers), Liquid Petroleum Gas Carriers or LPG, Bulk Carriers, RoRo/Car Carriers, Passenger Vessels, Livestock Carriers, and Tugs. Rickaby opined that there are many ship types which can and do carry HNS 82 : i) Dry bulk carriers:- solid bulk cargoes, for example ores, fishmeal, manufactured powders. ii) Oil/Bulk/Ore or Combo Carriers:- multi purpose carriers of solid or liquid cargoes. iii) Container ships:-boxes for dry cargo, powders and/ or liquids in portable International Standard Organisation (ISO) tanks. iv) General cargo ships: cargo in consignments for example crates, boxes, drums, sacks and bags. v) Roll on, Roll off ferries:-vehicles that can carry internally unitized, package or bulk cargoes. vi) Chemical carriers:- specialised vessels designed to carry bulk liquid chemicals. vii) Gas carriers:-specialised vessels designated to carry liquefied gas. 80 Brodie Peter, Dictionary Of Shipping Terms, 5th ed., (London: Informa, 2007) at 211. 81 Id at 252. 82 Rickaby, Simon, "Marine response to HNS and dealing with the MSC Napoli contaminated cargo", 15 January 2010, <http://www.spillcontrol.org/IMO Documents?Braemar Howells HNS paper Nov 2008> , 15 June 2010, 11.45 am. Based on Rickaby's assessment, it may be concluded that most of the HNS ships referred to are included in the VTS Port Klang. The HNS may be carried in solid, liquid or gaseous forms. As Rickaby said, all ships passing along the Straits of Malacca have the potential to carry HNS but no one can detect which ships carry HNS except when the HNS ship enters a Malaysian port. However, the type of ship that passes through is indicative of the cargo carried. The HNS ships are very large crude carriers, LNG carriers, LPG carriers, Bulk carriers, roro car carriers, passenger vessels, livestock carriers, and tugs. 83 The volume of shipping traffic of the above ships in the Klang VTS is shown in Table 2.2. The table also includes shipping statistics on government and navy vessels as they enjoy sovereign immunity under the 1982 Law of the Sea Convention, fishing vessels and others. The latter do not fall within the HNS category but are included for the sake of a complete picture. Table 2.2 shows that the number of VLCCs/ Deep Draft Vessels calling at Port Klang was 2,027 in 1999 whereas in 2006, the number stood at 3,851 representing a 5.6 % increase over the years. The number of tanker vessels calling at Port Klang was 83 VLCCs are large tankers of no official size but variously described as being one between 100,000 tonnes deadweight and 350,000 tonnes deadweight.

These tanker vessels are designed for the carriage of liquid in bulk, her cargo space consisting of several, or indeed many tanks. Tankers carry a wide variety of products, including crude oil, refined products, liquid gas and wine. Size and capacity range from the ultra large crude carrier (ULCC) of over half a million tonnes deadweight to the small coastal tanker. Tankers load their cargo by gravity from the shore or by shore pumps and discharge using their own pumps. LNG carriers are ships designed to carry natural gas (methane). The gas is held in a liquid state by pressure and refrigeration. The cargo-carrying capability consists of special tanks whose upper sections often protrude above deck height in domed or cylindrical form. LNG carriers are also known as methane carriers. LPG ships are designed to carry liquid petroleum gas, such as butane or propane. These are carried in special tanks under pressure and at very low temperatures. The tanks are often rectangular in section and may be flanked by wing or hopper tanks used to carry water ballast. A Bulk Carrier is a single deck ship designed to carry homogeneous unpacked dry cargoes such as sugar or cereals. Such ships have large hatchways to facilitate cargo handling, hopper sides and wing tanks. The latter are used either for the carriage of grain, other bulk cargoes or water ballast. Bulk carriers, or bulkers as they are sometimes called, are built in a wide range of sizes and are generally gearless, although smaller vessels may have their own gear. RoRo/Car Carriers are ships which carry shipping containers and have cell guides within which to accommodate them: they also have decks to take roll-on roll-off cargo. They are also known as con-ro ships. Passenger Vessels are vessels having, typically, three decks on to which vehicles, both cars and trucks, are carried and having rail on several tracks allowing rail wagons to be transported. The vessel has overnight accommodation for passengers and may well have entertainment and shopping facilities on board. The vehicle decks are interconnected by internal ramps. Livestock carriers are ships used for the carriage of livestock, mainly sheep. Many are converted from oil tankers and dry cargo ships, although a few have been purpose-built. Ships which have been converted have essentially only had livestock decks added: these consist of weather-protected pens in which the livestock are carried. They are also known as sheep carriers. A tug is a small powerful vessel used for towing or pushing ships in port, towing or pushing barges along rivers, or towing, for example oil rigs, out to sea. Its ability to pull or push is called its bollard pull which is expressed in tones. For the above definitions of ships see, Brodie, Peter. Dictionary of Shipping Terms, 5 th ed., (Great Britain: Informa Law, 2007). 50

11,474 in 1999 whereas in 2006, the number stood at 14,784 representing a 24.3% increase over the years. The number of LNG/LPG calling at Port Klang was 2,473 in 1999 whereas in 2006, the number stood at 3,297 representing a 5.2 % increase over the years. The number of cargo vessels calling at Port Klang was 5,674 in 1999 whereas in 2006, the number stood at 6,477 representing a 10.7 % increase over the years. The number of container vessels calling at Port Klang was 14,521 in 1999 whereas in 2006, the number stood at 22,615 representing a 33.0 % increase over the years. The number of bulk carriers calling at Port Klang was 3,438 in 1999 whereas in 2006, the number stood at 8,129 representing a 10.0 % increase over the years. The number of roro/car

TYPE	1999	2000	2001	2002	2003	2004	2005	2006	Total	%	
VLCC/Deep draft	85	11474	13343	14276	14591	15667	16403	14759	14784	115297	24.3%
LNG/LPG	87	2473	2962	3086	3141	3277	3343	3099	3297	24678	5.2%
Cargo Vessel	5674	6603	6476	6065	6193	6624	6340	6477	50452	10.7%	
Container Vessel	14521	18283	20101	20091	19575	20187	20818	22615	156191	33.0%	
Bulk Carrier	88	3438	4708	5370	5754	6256	6531	7394	8129	47580	10.0%
RORO/CAR carrier	1229	1761	1764	1980	2182	2440	2515	2863	16734	3.5%	
Passenger vessel	90	1919	3301	3151	3490	3033	2838	2299	2009	22040	4.7%
Livestock carrier	91	42	70	108	108	80	46	45	51	550	0.1%
Tug/Tow vessel	92	566	774	610	422	478	568	420	372	4210	0.9%
Gov 93 / Navy Vessel	93	117	155	111	120	130	153	81	960	0.2%	
Fishing Vessel	52	44	60	38	35	67	34	39	369	0.1%	
Others	457	828	854	942	1951	982	957	1081	8052	1.7%	
Total	43965	55957	59314	60034	62334	63636	62621	65649	473510	100.0%	

84 Table 2.2: Email interview with Encik Ahmad Nordin bin Ibrahim, Head of Vessel Traffic Services Unit, Malaysia Marine Department, 5 July 2007. 85 Brodie, Peter. Dictionary of Shipping Terms, 5 th ed., (Great Britain: Informa Law, 2007) at 252. 86 . Id at 234. 87 Id at 151. 88 . Id at 48. 89 . Id at 201. 90 . Id at 183. 91 Id at 151. 92 Id at 246. 93 Government vessel means a vessel owned by the Government and operated directly by the Government . http://www.acquisition.gov/far/html/Subpart_47_5.html, 9 June 2010, 11 am. carriers calling at Port Klang was 1,229 in 1999 whereas in 2006, the number stood at 2863 representing a 3.5 % increase over the years. The number of passenger vessels calling at Port Klang was

1,919 in 1999 whereas in 2006, the number stood at 2009 representing a 4.7 % increase over the years. The number of livestock carriers calling at Port Klang was 42 in 1999 whereas in 2006, the number stood at 51 representing a 0.1% increase over the years. The number of tug/tow vessels calling at Port Klang was 566 in 1999 whereas in 2006, the number stood at 372 representing a 0.9 % increase over the years. The number of government/navy vessels calling at Port Klang was 93 in 1999 whereas in 2006, the number stood at 81 representing a 0.2 % increase over the years. Overall, the numbers of ships that reported at the VTS Klang from 1999 to 2006 was 473,510. Of this figure, it could be inferred that approximately 441,539 were HNS ships. A significant increase of 27 % ships was reported from 1999 to 2000 alone. From Table 2.2 we see that container vessels contributed the highest portion (32.99%) of the total number of ships that have reported to the VTS. This is followed by tanker ships which comprised 24.35%. The number of container ships continues to increase year by year and judging from the trend the number is likely to increase and dominate the league of ships through the Straits of Malacca. The tankers follow a similar pattern but at a slower pace especially after a sudden decrease in 2005 and gaining a rather constant number thereafter. A rather interesting pattern can be observed in the total number of bulk carriers using the Straits of Malacca. Although it constitutes 10.05% of the total portion of ships, the rate of increase is very significant. With the ongoing trend, bulk carriers may become one of the leading users of the Straits in the future. Based on these statistics, the number of ships which specifically carried oil and Number of Vessels chemicals, for example, the VLCC, tanker vessel and LNG/LPG has increased. As demonstrated in Table 2.2, overall there were 43,965 ships that reported at VTS Klang in 1999 and 65,649 ships that reported at VTS Klang in 2006. The important finding from this statistic is that there has been a yearly increase in the number of HNS ships that reported at VTS Klang as shown from 1999 till 2006. Table 2.2 on shipping vessels statistics that reported at Port Klang when represented in Figure 2.1 reads as follows: Reported Vessels VTS Klang 25000 20000 15000 10000 5000 VLCC/Deep draft Tanker Vessel LNG/LPG Cargo Vessel Container Vessel Bulk Carrier RORO/CAR carrier Passenger vessel Livestock carrier Tug/Tow vessel Gov/Navy Vessel Fishing Vessel Others 0 1999 2000 2001 2002 2003 2004 2005 2006 Year Figure 2.1: Graph depicting shipping statistics from 1999-2006 94 The shipping statistics for January – December 2008 95 shows that 73090 ships reported at the Klang VTS 96 which have the potential to carry HNS: ? VLCC/Deep Draft Carriers - 4040. ? Tanker Vessels - 15894. 94 Figure 2.1: Email interview with Mr Ahmad Nordin bin Ibrahim, Head of Vessel Traffic Services Unit, Malaysia Marine Department, 5 July 2007. 95 <http://www.marine.gov.my> 16 April 2010, 3.30 pm. 96 Statistics taken from Marine Department, <http://www.marine.gov.my>, 16 April 2010, 3.30 pm. 53 ? LNG/LPG Carriers - 3726. ? Cargo Vessels - 8794. ? Container Vessels - 26359. ? Bulk Carriers - 10256. ? Roro/Car Carriers - 3455. ? Tug Tows- 566. The trend of increasing traffic may also be gathered from traffic data reported via the Malacca Straits Ship Reporting System, or STRAITREP. 97 Between 2000 and 2008, the number of merchant vessels exceeding 300 GRT using the Straits increased by almost 37 per cent. 98 LNG/LPG tankers using the Straits registered 26 % growth from 2,962 to 3,726 while container and general cargo vessels rose 41% over the same period. 99 These figures exclude cross traffic and other vessel types plying the Straits. 100 In addition almost 50 % of global energy shipments pass through the Straits annually. 101 Oil and chemical pollution, ballast water and solid waste discharges, vessel accidents and incidents are major threats to this delicate balance which if not properly managed, have the potential to adversely affect the livelihood of the surrounding communities and threaten the nation's long term economic sustainability. 102 Hence, a key hydrographic survey within the TSS of the Straits of Malacca and Singapore is now underway, as part of the Marine Electronic Highway (MEH) Demonstration Project, a regional project that IMO is executing for the Global 97 Bateman Sam, Ho Joshua, Chan Jane, "Good Order At Sea In Southeast Asia" S.Rajaratnam School Of International Studies, Nanyang Technological University, Policy Paper, 2009. 98 MIMA, 24 August 2010, http://www.mima.gov.my/index.php?option=com_content&view=article&id+85&Itemid=88 99 Ibid. 100 Ibid. 101 Ibid. 102 Ibid. Environment Facility. 103 The purpose is to produce an undated electronic navigation chart of the area. 104 The overall system-which will also include positioning systems and real-time navigational information like tide and current data, as well as providing meteorological and oceanographic information-is designed to assist in the overall traffic management of the Straits and provide the basis for sound marine environmental protection and environment. 105 2.4.2 Penang Port and Johor Port The Penang Port was established on 7 th December 1993, as a private company called the

3Penang Port Sdn Bhd (PPSB), a government- owned firm by the Ministry of Finance, which took over all facilities and services from the Penang Port Commission. The latter now acts as a regulatory body.

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3Pilotage is compulsory for all vessels navigating in the pilot district of Penang with exception of fishing vessels and vessels of 600 grt and below

as there are many difficulties with its navigational approach for which anchorages are offered which is particularly relevant for HNS carriers. 107 The number of HNS carriers calling at the Penang Port is not obtainable because as to date, there is no Penang Port VTS. 103 IMO, 24 August 2010, http://www.imo.org/Newsroom/mainframe.asp?topic_id=1859&doc_id=12540 104 Ibid. 105 IMO, 24 August 2010, http://www.imo.org/Newsroom/mainframe.asp?topic_id=1859&doc_id=12540 106

3Under the government's privatization policy, the share in PPSB was sold to the private sector although the government was expected to hold a golden share.

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3Navigational approach: a. North Channel Light Float in position Lat 5(35.9 N.Long 100)12.45 E for vessels entering the harbor through the North Channel. Vessels awaiting Pilot can anchor at North Channel, in the pilot waiting area within the following co-ordinates: i) Lat 05(35.8 N Long 100(10.9 E ii) Lat 05 (34.3 N Long 100(10.9 E iii) Lat 05(32.7 N Long 100(13.0 E iv) Lat 05(34.2 N Long 100(13.0 E An approach channel of 10 nautical miles x 183 wide for 1 line of traffic has been dredged at the North Channel. The available depth of water at the channel is periodically declared to port users. Current depth available is 10.2m A.C.D. b. For entry through the South Channel the Pilot will be taken on board in vicinity of Rimau

3Lighthouse. Approach through the South Channel is restricted to vessels of 28m air draft – due to existence of the Penang Bridge. Current depth 5.8m ACD. Anchorage: c. The Man of War, Petroleum, Quarantine, Explosive and local vessels anchorages are marked on Charts of the Penang Harbour (AC No 3732). There is no specific anchorage area in the harbour for vessels other than mentioned above. The other vessels are normally anchored South of Lat 5 (26N and North of Lat (22.80 N. Between

the mainland and the island clear of the berth's fairways and shallow areas.

There are three ports in Johore, namely the Johore Port, the Tanjung Langsat Port, and the Port of Tanjung Pelepas. 108 The Johor Port Berhad manages and operates the Johore Port in Pasir Gudang, Johor. 109 In the late 1960's, the Malaysian Government had responded to the increasing demands for a port to be established independent of a foreign port. 110 Thus, Johore Port was established with facilities adequate for the handling of local cargo and managed by the Federal Government. 111 It was the first port in Malaysia to be gazetted as a Free Zone following the multiplying benefits to attract more cargo and businesses. 112 Johor Port handles all port-related activities including terminal management, cargo handling, storage and warehousing, logistics and marine operations. 113 Johore Port Berhad claims it has met the stringent requirements such as good security, efficient Free Zone management and excellent multi-purpose facilities. 114 Johor Port is currently one of only four ports in Asia listed on the London Metal Exchange (LME), the significance of which is that the LME is the world's largest trading platform for non-ferrous metals, and Johore Port is considered a safe point of storage and distribution of seven such metals: zinc, copper, lead, tin, nickel, aluminium alloy and base aluminium. 115 Johore Port Authority is the regulatory body for Johore Port Sdn Bhd, which took over all port facilities and services in January 1993. 116 108 Tanjung Langsat Port is the third port in Johore, designed to complement the Port of Tanjung Pelepas and Johore Port. "Port of Tanjung Langsat to emerge leading chemical logistics hub" <http://www.apamalaysia.com/category/johor/>, 21 August 2010. 109 The National Maritime Portal, <http://www.portsworld.com/ports/johorport.htm>, 6/8/2010. 110 Johor Port-Leading Multi-Purpose Port in Malaysia Operates in Vibrancy, <http://www.apamalaysia.com/category/johor/>, 12 August 2010. 111 Ibid. 112 Ibid. 113 Ibid. 114 Ibid. 115 Ibid. 116 The National Maritime Portal, <http://www.portsworld.com/ports/johorport.htm>, 6/8/2010. The port was fully privatized in August 1995 to Seaport Terminal (Johore) Sdn Bhd which became the holding company of Johore Port Bhd. Location: Lat 01 (26.06 N) Long 103 (54.25 E). The National Maritime Portal, <http://www.portsworld.com/ports/johorport.htm>, 6/8/2010. For all ships, including HNS carriers, the Port Limits include all the area of water enclosed by geographical coordinates. 117 Pilotage in the Johore Port is compulsory for vessels over 45 m Length Overall (LOA) (or over 30 m in height) and is available 24 hours. 118 Several anchorage areas have been designated within the port water limits and is indicated in all the navigational charts. 119 The Port of Tanjung Langsat (Johore Port Authority) in Pasir Gudang, is expected to emerge as the leading chemical logistics hub in South East Asia. 120 Positioning itself as Southeast Asia's premier specialty terminal, it handles bulk cargo such as liquefied petroleum gas and dangerous chemicals. 121 Tanjung Langsat Port is the third port in Johor, designed to complement the Port of Tanjung Pelepas and Johore Port. Johor Corporation, which owns Tanjung Langsat Port, has invested RM300 million to develop five liquid cargo berths and another RM600 million will be invested to install additional berth facilities at the port. 122 With the completion of the Tanjung Langsat 117 The National Maritime Portal, <http://www.portsworld.com/ports/johorport.htm>, 6/8/2010. The coordinates are: i) On the west by a line drawn due South from Tanjong Bin (1 (20 N, 103(32.02 E); ii) On the north by the southern shores of the state of Johore; iii) On the east by the limits of a line drawn 229 from Tanjong Siapa (1(20.6 N, 140(08.02 E); and iv) On the south by the limits of territorial waters of Johore. 118 The National Maritime Portal, <http://www.portsworld.com/ports/johorport.htm>, 6/8/2010 Pilotage exemption may be granted to vessels over 45 m LOA by application to the Marine Manager. Vessels are required to send in the ETA 24 hours before arrival or departure to Johor Port Control. The National Maritime Portal, <http://www.portsworld.com/ports/johorport.htm>, 6/8/2010. The Pilot will board the ship 2 nms south-west of Tanjong Setapa Lt (1(20.6N 104(08.2 E). There is no limitation imposed on the size of vessels passing through the fairway except for the draft. The National Maritime Portal, <http://www.portsworld.com/ports/johorport.htm>, 6/8/2010. The main channel in the East Johore Straits has a depth of water up to the approximately 12.5 m The National Maritime Portal, <http://www.portsworld.com/ports/johorport.htm>, 6/8/2010. utomatic Call Distributor (ACD) up to the port waterfront and 1.6 m ACD for area beyond up to the cause-way The National Maritime Portal, <http://www.portsworld.com/ports/johorport.htm>, 6/8/2010. 119 The National Maritime Portal, <http://www.portsworld.com/ports/johorport.htm>, 6/8/2010. These are: a) General purposes; b) Dangerous goods and explosives; c) Quarantine; d) Petroleum; and e) Lay-up. 120 "Port of Tanjung Langsat to emerge leading chemical logistics hub" <http://www.apamalaysia.com/category/johor/>, 21 August 2010. 121 Ibid. 122 Ibid. . Port liquid cargo berth, the port can now handle 26

million metric tones of liquid cargo annually, making it the biggest liquid cargo port in the country and region.

123 \ 2.5 SHIPPING ACCIDENTS IN THE STRAITS OF MALACCA From the above discussion, it is clear that based on the large number of ships reporting to the VTS, the Straits of Malacca is preferred to the Strait of Lombok as super large tankers from the Middle East can save time and distance up to 1,600 kilometers which comes about to three days sailing time. 124 This increase in the number of ships will lead to the problem of HNS marine pollution should an accident occur along the busiest waterway in the world. While strait States should prepare for an incident of HNS pollution, generally, there is a need to ensure that ships exercise navigational rights in an orderly and safe manner as there has been a tremendous increase in the number of ships where world tonnage increased six fold between 1948 and 1998 creating serious traffic problems and followed by the enormous increase in ships size with consequent reductions in maneuverability as a supertanker travelling at full speed takes several miles to stop. Ships now carry more dangerous cargoes, such as oil, liquefied natural gas, toxic chemicals and radioactive matter, thus making the consequences of any accident more serious. The economic recession of the 1970s and 1980s led to a decline in shipbuilding, with the result that the average age of ships has increased, the average age in 1995 being 16.4 years, making older ships inherently less seaworthy. 125 Furthermore, the activity of shipping bears risks and potential consequences of unsafe shipping activity which include: 126 123 Ibid. 124 Ho, Joshua, Institute of Defense and Strategic Studies, Singapore, the IMO-KL Meeting on the Straits of Malacca and Singapore, 5 October, 2006. 125 Churchill, R.R, The law of the sea, 3rd ed., (United Kingdom: Manchester University Press, 1999), at 256. 126 Ambrose Rajadurai, Regulation of Shipping: The Vital Role of Port State Control, Maritime Law Association of Australia & New Zealand Journal Volume 18, 2004 page 83. i) fire on board a ship carrying toxic or highly flammable cargoes, in proximity to population centers or important shore facilities, ii) marine casualty resulting in the blockage of a major port, iii) pollution of the marine environment as a consequence of accidental or deliberate discharge of cargo or ballast overboard 127 , iv) physical damage to facilities, the marine environment 128 or other vessels as a consequence of collision. 129 Shipping accidents do happen although preventive measures are taken by the strait States. One of the significant measures taken by the strait States is to ensure navigational safety by designating the Traffic Separation Scheme (TSS) in order to guide ships from head on collision within the high traffic movement along the Straits of Malacca. Only two (2) accidents were reported in 1999 but the number increased to the highest level of eleven (11) in 2003. The number dropped to its lowest in the subsequent year (2004), only one (1), but increased by six (6) accidents in 2006. The majority of the accidents involved container ships (29.7%) followed by tankers (21.6%) and both general cargo and bulk carrier (18.9%). It has been reported recently in 2010 that, a tanker collided with a bulk carrier within the Traffic Separation Scheme (TSS) near Singapore. Detail statistics on the number of shipping accidents occurring within and outside the TSS in the year 1999 to 2006 are given in Table 2.3 and Table 2.3.1 shows shipping accidents statistics that have occurred within and outside the TSS in the year 1999 to 2006. 127 Or as in the case of the Prestige which broke up and sank off the Spanish in December 2002, cargo leaking from the sunken wreck- see: <http://www.europa.eu.int/comm/transport/themes/maritime/prestige/com> . 128 For example contact with delicate coral reef, such as occurred when the container ship Bunga Teratai Satu ran aground on Sudbury Reef off the Queensland coast in November 2001 <http://www.gbrmpa.gov.au/corpsite/management/eim/sudbury> . 129 The collision between the crude oil tanker Nagasaki Spirit and the container ship Ocean Blessing in the Malacca Straits on 19 th September 1992 resulting in the death of all but 2 crew members of both ships, total loss of both vessels and spill of more than 12 million litres of crude oil into the sea. Table 2.3 Types of accidents that have occurred within and outside the TSS: Source-Marine DATE 18 Dec 1999 VESSEL Department, Peninsular Malaysia 130 VESSEL TYPE ACCIDENTS WITHIN TSS 1999 Mv Jenwin/ General Cargo/ collision x Asian century Car Carrier OUTSIDE TSS 2000 20 April 2000 Cm Sun Shine General Cargo fire x 19 Sept 2000 Mv Cho Yang General Cargo fire x 16 Oct 2000 Bunga Kelana 5 Tanker aground x 2001 14 Jan 2001 8 Mac 2001 Mv Pristine Bulk Carrier fire x 30 Aug 2001 2002 18 April Tank oil/ Vassil Tanker/Bulk collision x 2002 Levski Carrier 28 June 2002 24 Oct 2002 Mt Karimun Tanker aground x 2003 5 Jan 2003 26 Feb 2003 13 Mac 2003 18 May 2003 Mv Orient 28 Oct 2003 Aishwarya/ Container/ collision x Mv Johan Bright Container 23 Nov 2003 Mv Sitif 2 Container sink x 2004 5 Mac 2004 Wahyuni General Cargo fire x 2005 11 June 2005 10 Sept 2005 Mv New Glory Container fire x Mt Gertrude/ Tanker / collision x Mv Hatsu Prima Container 130 Email interview with Encik Ahmad Nordin bin Ibrahim, Head of Vessel Traffic Services Unit, Malaysia Marine Department, 5 July 2007. 24 Mac 2006 30 April 2006

4 Oct 2006 11 Nov 2006 Mv Sinokor Seoul/ Mv California 2006 Container/ collision x Bulk Carrier Mt Suva Tanker fire x Mt Double Jot/ Tanker/ collision x Mv Cherkassy Bulk Carrier Mv Aghios Makarios Bulk Carrier fire x

Table 2.3.1: Number and types of accidents that occurred within and outside the TSS: Source- Marine Department, Peninsular Malaysia. 131

TYPE	1999	2000	2001	2002	2003	2004	2005	2006	TOTAL	%
VLCC/ Deep draft	0	0.0%								
Tanker Vessel	1	2	1	1	2	8	21.6%			
LNG/LPG	0	0.0%								
General Cargo	1	3	1	1	1	7	18.9%			
Container Vessel	2	1	5	2	1	11	29.7%			
Bulk Carrier	1	1	2	3	7	18.9%				
RORO/C AR carrier	1	1					2.7%			
Passenger vessel	0	0.0%								
Livestock carrier	0	0.0%								
Tug/Tow vessel	1	1					2.7%			
Gov/Navy Vessel	0	0.0%								
Fishing Vessel	1	1	2	5.4%						
Total(vessel type)	2	4	5	5	11	1	3	6	37	%
							5.4%			10.8%
										13.5%
										13.5%
										29.7%
										2.7%
										8.1%
										16.2%
										100.0%

TYPE OF ACCIDENTS 1999 2000 2001 2002 2003 2004 2005 2006 TOTAL %

TYPE OF ACCIDENTS	1999	2000	2001	2002	2003	2004	2005	2006	TOTAL	%
Collision	1	2	2	5	1	11	55.0%			
Fire	2	1	1	1	5	25.0%				
Aground	1	1	1							
Sink	1	1	5.0%							
TSS	1	3	2	5	1	2	1	15		
outside TSS	2	1	1	3	7					

The finding concludes that in terms of types of accidents, more than 50% are related to collisions within the TSS – Table 2.3.1 So there is high risk and probability that HNS ships will collide with other HNS ships or with other type of ships. Finally, Table 2.3 and Table 2.3.1 132 refer to the type of vessel, the form of incident, the year of incident and location of incident whether in the TSS or outside it. At present, the Malaysia Marine Department has issued a Malaysian Shipping Notice 35/2010 regarding prohibition of anchoring in the Straits of Malacca and Singapore. 133 There has been a proliferation of vessels anchoring within the TSS and Precautionary Areas in the Straits of Malacca and Singapore as well as between the landward limits of the TSS and approaches to the ports. These vessels pose a risk to the safety of navigation by obstructing port approaches and traffic flow. 134 There have been several reported cases of collision incidents involving vessels as well as reports on submarine cable damage caused by such indiscriminate anchoring of vessels at non-designated anchorages along the Straits of Malacca and Singapore. Mariners are therefore reminded not to anchor in all areas in the TSS of the Straits of Malacca and Singapore; as well as between the landward limits of the TSS and approaches to the ports. Vessels entering port are to anchor in the anchorages designated. 135 Mariners are hereby given 132 Email interview with Mr Ahmad Nordin bin Ibrahim, Head of Vessel Traffic Services Unit, Malaysia Marine Department, 5 July 2007. Statistics of shipping traffic from 1999 till 2006 are prepared by Mr Ahmad Nordin. However the statistic of shipping traffic at Klang VTS for year 2007 is taken from <http://www.meh-project.com/setting/maritime-importance>, 31 May 2010, 11 am. The statistic of shipping traffic in 2008 is taken from <http://www.marine.gov.my> on 31 May 2010, 11 am. The researcher inserted the statistics of shipping traffic from 2007 to 2008 in the appendix. 133 Malaysia Marine Department, Malaysian Shipping Notice 35/2010 - Notification of prohibition of anchoring in the Straits of Malacca and Singapore, 24 August 2010, <http://www.marine.gov.my> 134 Ibid. 135 Ibid. notice that the Maritime Authorities of Malaysia will closely monitor identities and locations of vessels that anchor indiscriminately. 136 The relevant Authority will take appropriate action including reporting to the flag State of the vessel. 137 Where submarine cable damage occurs, the relevant authority will promptly share information with the cable owners and other interested parties to facilitate legal proceeding to cover compensation from the owners and masters of vessels responsible for the damage. 138 In exceptional circumstances such as an emergency where anchoring cannot be avoided, mariners are advised to carefully ascertain the location of submarine cables from nautical charts and publications to avoid anchoring over these cables. 139 According to H.M.Ibrahim, a few major accidents in the Straits of Malacca damaged the environment, depositing oil sludge on tourist beaches, destroying fishing nets and livelihood of fishermen and reducing the fish supply to the population centres of the west coast of Peninsular Malaysia. 140 This suggests that the Malaysian government should be proactive in anticipating the possibility of any HNS accident.

2.6 IMPORTANCE AND USEFULNESS OF THE STRAITS TO MALAYSIA

2.6.1 Natural Resources

The Straits is rich in marine fauna and flora that is characteristic of tropical estuarine environments. 141 The abundance of sea grass beds, mangrove swamps, coral reefs and wetlands enriches the associated coastal marine environment, which also acts as a stopover point for migratory birds on seasonal transition. This estuarine environment 136 Ibid. 137 Ibid. 138 Ibid. 139 Marine Electronic Highway, "Protecting the Environment of the Straits", 31 May 2010, http://www.meh-project.com/setting/copy_of_maritime-importance 140 H.M.Ibrahim, "Straits safety not just littoral states' burden", New Straits Times, 25 November 2008, 22. 141 Marine Electronic Highway, "Protecting the Environment of the Straits", 31 May 2010, http://www.meh-project.com/setting/copy_of_maritime-importance serves as a unique heritage to the world. 142 In addition, the Straits are rich

in natural resources such as capture fisheries, aquaculture, mineral and petroleum reserves, which have contributed significantly to the economic development of the strait States. 143 Collectively, the benefits that can be derived from the natural ecosystems have been valued in billions of dollars as shown in the table below. 144 Environmental management in the Straits is a national, sub-regional and international issue. Table 2.4: Economic value of natural assets in the Straits of Malacca and Singapore 145 TOTAL ECONOMIC NATURAL VALUE (US\$)[1] ASSET Gross Net Mangroves 3986979940 3248389011 Mudflats 49716623 28168444 Beaches 877252612 566346.515 Coral reefs 732959386 563369103 Sea grass 10837057 2405358 Seaweeds 19728392 2970988 Fisheries 1569790275 614532258 From ecosystems 1304801911 562250053 Aquaculture 287392590 67227576 Sea lanes 600210000 600210000 Total 9439668786 5690089138 Source: GEF/UNDP/IMO Regional Programme, 1999- Total Economic Valuation: Coastal and Marine Resources in the Straits of Malacca. 2.6.2 Fisheries 142 Ibid. 143 Ibid. 144 Ibid. 145 The economic value of natural assets is based on 1995 prices and is the annual value of the market and non-market benefits of the identified assets. The value of sea lanes refers to the operating costs saved by tankers using the Malacca Straits instead of the Lombok- Makassar Straits, contributing 11% to the total net benefit (Source-GEF/UNDP/IMO Regional Programme, 1999- Total Economic Valuation: Coastal and Marine Resources in the Straits of Malacca). http://www.meh-project.com/setting/copy_of_maritime-importance, 7 June 2010, 11 am. The fisheries sector in Malaysia in the year 2006 comprised

2 marine capture fisheries and aquaculture which produced 1,595,961.51 tonnes of food fish with a value of

RM 6

2,262.11 million and 644,099,783 pieces of ornamental fish valued at RM 181.74 million.

146

2 Marine capture fisheries produced 1,379,770 tonnes, contributing 86.45% to the total national fish production with a value of

RM 4

2,939.32 million, increasing by 14.07 % from the year before (2005). 147 In the fisheries sub-sector, the coastal fisheries remained the major contributor with a production of 1,128,439 tonnes valued at

RM 4

2,077.94 million or 70% of the nation's fish production.

148 Based on the research, 551,813 tonnes of marine fishes are caught in 2006 in the Straits of Malacca.

2 For the year 2006, the work force of the fisheries sector consisted of 97,947 fishermen working on licensed fishing vessels while 20,100 fish

culturists were involved in various aquaculture systems. 149 A total of 38,276 fishing vessels were licensed in 2006 with the majority operating traditional gears.

150 In the year 2004, roughly 45% of total marine fish landings or 593,476 tonnes of marine fishes were caught in the Straits of Malacca. 151 Based on Table 2.5, in the year 2006, 551,813 tonnes of marine fishes were caught in the Straits. There are 14,646 152 Malaysian registered fishing vessels in the straits and this number does not include Indonesian fishing vessels.

2A total of 97,947 fishermen were recorded working on licensed fishing vessels in 2006 compared with 90,702 in 2005, an increase by 7.98%. 153 Out of this total

number of fishermen, 26,167 were foreigners (non-Malaysian citizens) from Thailand, 146 <http://www.dof.gov.my>. 147 Ibid. 148 Ibid. 149 Ibid. 150 Ibid. 151 Mohd Nizam Basiron, Environmental Protection In The Straits Of Malacca, An Assessment page 1, Maritime Institute of Malaysia. 1- 2 August 2006, Prince Hotel And Residence, Kuala Lumpur . 152 Annual Fisheries Statistics 2004, Volume 2, Department of Fisheries Malaysia, page 46. 153 Jabatan Perikanan Malaysia, <http://www.dof.gov.my/v2/>.

2Indonesia and Myanmar. 154 The number of fishermen who worked on fishing vessels operating commercial gears namely trawlers and purse seiners was 44,231

2(54.84%) and fishermen worked on fishing vessels operating traditional gears.

155

2On the whole, the number of licensed fishing vessels has increased by 6.27% from 36,016 units in 2005 to 38,276 units in 2006. The rise was due to the additional number of fishing vessels (especially sampan) licensed during 2006. The number of licensed fishing vessels in Peninsular Malaysia was 23,483 units in 2006 which accounted for 61.35% of the total nation's fishing fleet. The number of fishing fleet recorded for the West Coast was 17,003 units contributing 72.40% in Peninsular Malaysia, while the East Coast recorded a percentage of 27.59% amounting to 6,480 units only. In short, the fisheries sector within the Straits of

Malacca plays an important role in the Malaysian economy. Table 2.5:

2Production of marine landings by state in the year 2006.

156 Source: Jabatan Perikanan Malaysia 154 Ibid. 155 Ibid. 156 Jabatan Perikanan Malaysia, <http://www.dof.gov.my/v2/>. 66 2.6.3 Marine Fauna and Flora A fishery is related to the condition of the marine ecosystem and thus the importance of the presence of mangrove forest, coral reefs and sea grass beds. 157 Mangroves belong to a complex group of plant communities which normally occur above the mean sea level in the intertidal zone of marine coastal environments or estuarine margins. 158 Mangrove forests constitute a major portion (about 52% of the total length of Malaysia's coastline) of the coastal ecosystem. 159 It has been reported that many finfish and shrimp use mangroves as breeding habitat and protective shelter for their larvae and juveniles. 160 The threat to Malaysia's mangrove lies in land conversion or deforestation for agriculture, industry and to a lesser extent, for aquaculture. 161 ASEAN countries have lost significant areas of their original mangrove forests. 162 Coral reefs are essential breeding and nursery areas for many types of fish. 163 . The Department of Fisheries has taken steps to conserve and rehabilitate the country's coral reefs by gazetting as marine parks 164 many of the islands where corals are found. 165 The sea grass beds are endangered by erosion, faecal contamination and heavy metal pollution. 166 Based on the research organized by the University of Malaya Maritime Research Center (UMMReC) on the islands of Pulau Jarak and Pulau Perak within the strait, these findings are observed; six (6) species of birds, all canopy users, 157 Consumers' Association of Penang, comp., State Of The Environment In Malaysia, (Penang: Consumers' Association of Penang). 158 Ving Ching, Chong, Mangroves and Fishery Connectivity, The MIMA Bulletin, Volume 7 No 2/99, ISSN: 1394-5947. 159 Ibid. 160 Ibid. 161 Ibid. 162 Ibid. Singapore (99%), Philippines (70%), Vietnam (63%), Thailand (60%), Indonesia (32%) and Malaysia (25%). 163 Ibid. The biggest threats to the corals have been due to exploitation for commercial and tourism purposes, coupled with siltation and sedimentation caused by development projects. Ibid. 164 Pulau Payar Marine Park (located on the northwest coast of Malaysia)was the first marine park, established in 1987. Nickerson, Donna, Hiew, Kevin, Special Area Management for Conservation and Sustained Production of Marine Biodiversity in Malaysia ,The MIMA Bulletin, Volume 7 No 2/99, ISSN: 1394-5947. 165 Ibid. 166 Pulau Payar Marine Park (located on the northwest coast of Malaysia)was the first marine park, established in 1987. Nickerson, Donna, Hiew, Kevin, Special Area Management for Conservation and Sustained Production of Marine Biodiversity in Malaysia ,The MIMA Bulletin, Volume 7 No 2/99, ISSN: 1394-5947. including the White-bellied Sea-eagle at the lighthouse at the densely forested Pulau Jarak while Pulau Perak with the 20-30% vegetation cover observed eight (8) species of birds. 167 Pulau Perak's reef structure was found to be very unique and among the largest boulder corals in Peninsular Malaysia. 168 Zooplankton (dominated by copepods, with others that included jellyfish, arrow worm, polychaete worm, starfish, brittle star, clam, barnacle, shrimp and crab larvae) were particularly rich in the open waters around Pulau Jarak and the Sembilan Islands. 169 It is vital for the relevant authorities to protect and preserve the marine eco-system from HNS pollution. 2.6.4 Investments The major tourist centers in Malaysia are located along the straits; Langkawi, Penang, Pangkor, Port Dickson and Malacca 170 and they have to be clean from vessel-sourced, accidental and/or land-based pollution. The growth of ports in Malaysia and Indonesia indicates that the trading sector is dependent on maritime transport for the carriage of the country's imports and exports. The Malaysian ports within the Straits were highlighted earlier. 171 On the other hand, the Indonesian (Sumatera) ports along the Strait of Malacca are Sabang, Malahayati, Lhokseumawae, Langsa, Tebing Tinggi, Belawan and UTPK, Kuala Tanjung, Tanjungbalai, Bagansiapiapi, Melaka, Dumai and 167 Siew-Moi Phang, Azhar Hashim & others, UMMREc Expedition to the Lesser Known Islands in the Straits of Malacca: Pulau Jarak, Pulau Perak and Pulau Sembilan Group of Islands, The Straits of Malacca: Building a Comprehensive Security Environment, (Kuala Lumpur, 11-13 October 2004). 168 It is basically a sheer 90 degrees drop-off to about 34 meter, where it levels off for around 5 meter before dropping off again. Underwater horizontal visibility was about 50 meter and around 35 meter vertically. To the southeast of Pulau Perak, at least 8 (eight) large boulder corals reaching the height of 40 meters flourish. 169 Ibid. 170 Ahmad, Hamzah ,ed., The Straits of Malacca, International Co-Operation In Trade, Funding & Navigational Safety, (Petaling Jaya, Pelanduk Publication, 1997), at 14. 171 Forbes, Vivian Louis, "The Malacca Strait In The Context Of The ISPS Code", Conference On the Strait of Malacca: Building a Comprehensive Security Environment, (Kuala Lumpur, 11-13 October 2004). Bengkalis. 172 They indicate the importance of the Straits to Malaysia and Indonesia's (Sumatera) economy. 2.7 MARINE POLLUTION Pollution is defined as follows: "Pollution" is defined in the Dictionary of Environment and Development as; the addition to the natural environment of substances that, through either their composition or the amount released cannot be

rendered harmless by normal biological processes. 173 "Pollution" in section 2 of the Malaysia Environmental Quality Act 1974 (Act127) means any direct or indirect alteration of the physical, thermal, chemical, or biological properties of any part of the environment by discharging, emitting, or depositing environmentally hazardous substances, pollutants or wastes so as to affect any beneficial use adversely, to cause a condition which is hazardous or potentially hazardous to public health, safety, or welfare, or to animals, birds, wildlife, fish or aquatic life, or to plants or to cause a contravention of any condition, limitation, or restriction to which a license under this Act is subject. 174 "Pollution" as defined in the Dictionary of Environmental Science and Technology, the introduction into the environment of substances or affects that are potentially harmful or interfere with man's use of environment or interfere with species or habitats. 175 172 Ibid. 173 Crump, Andy, Dictionary Of Environment And Development, People, Places, Ideas and Organizations, (London: Earthscan Publications Ltd, 1991) at 201. 174 Section 2, Environmental Quality Act 1974. 175 Porteous, Andrew, Dictionary of Environmental Science and Technology, 2 nd ed., (England: John Wiley & Sons Ltd, 1999), at 430. 69 The marine environment in the Straits is polluted by a number of sources: land- based pollutants, oil spills, wastes and escapes caused, amongst other reasons, as a consequence of shipping casualties or off-shore oil production including discharges from drilling rigs or accidental well-blow outs and from desludging activities. 176 Major oil and HNS spill incidents have been reported in the Straits of Malacca and Singapore. 177 On 6 January 1975, MV Showa Maru spilled 54,000 barrels of crude oil and the vessel grounded in Strait of Singapore; on 20 September 1992, the MV Nagasaki Spirit collided with the MV Ocean Blessing and spilled 100,000 barrels of crude oil in the Straits of Malacca; on 15 Oct 1997, the MV Evoikos collided with the MV Orapin Global and spilled 175,000 barrels of crude oil in Singapore Straits; on 21 May 1999, the SS Sun Vista spilled 14,000 barrels of fuel oil and sank in the Straits of Malacca; on 3 October 2001, the MV Natuna Sea spilled 49,000 barrels of crude oil and grounded in the Straits of Singapore; on 13 June 2001, the Indah Lestari spilled 89,000 barrels of Phenol 178 and sank in the Johor Straits. The 533 ton MV Indah Lestari was on its way to East Kalimantan in Indonesia with some 600 tons of the poisonous industrial chemical phenol and 18 tons of diesel. 179 Phenol is a highly toxic chemical and this substance is included in the definition of HNS substances in the 1996 HNS Convention 180 The toxic spill killed thousands of fish and cockles reared in 85 offshore cages and the Singapore authorities warned its citizens to stay away from nearby waters. 181 Scientists argued that it would be tough to clean up the phenol, as it was soluble in water. 182 176 George, Mary, "Adequacy of Strait States Laws for the Control of Marine Pollution in the Straits of Malacca and Singapore", (2001) Asia Pacific Journal Of Environmental Law, Vol 6, Issue ¾, 241-295. 177 Department of Environment- Major Oil and HNS Spill Incidents. <http://www.doe.gov.my/index.php?option=view&id=326>. 178 Phenol is a highly toxic chemical and covered by the HNS Convention. 179 Thapa R B, Kusanagi M, Kitazumi A, Murayama Y, "Sea navigation, challenges and potentials in South East Asia: an assessment of suitable sites for a shipping canal in the South Thai Isthmus" Springer Science Business Media, GeoJournal (2007) 70:161-172, 15 April 2008. 180 The list of other HNS in the 1996 HNSC is mentioned in Chapter Three of this thesis. 181 Ibid. 182 Ibid. Malaysia has encountered several HNS accidents in the Straits of Malacca. It was reported in 1980 that three people were killed and more than RM 12 million worth of damage of dangerous cargoes occurred which was caused by fire and a series of explosions in Port Klang, Malaysia. 183 The fire raged for two days, destroyed four warehouses and severely damaged every other building in the port. The Choong Hong 3 incident occurred in 1997, 184 and the Indah Lestari which spilt phenol in the Straits of Johore in 2001. 185 The Governments of Indonesia, Malaysia and Singapore have also objected to the Japanese ship Akatsuki Maru, which was reportedly carrying one ton of radioactive plutonium (this amount is enough to make 150 nuclear bombs), that passed through the Straits of Malacca on its way back to Yokohama from Cherbourg in France. 186 On 19 th October, 2008, it was reported that a chemical-laden ship, Ing Hua Fu No 9 sank after a huge explosion at South point, Port Klang, Malaysia. 187 There were no casualties in the incident but the port authorities were asked to investigate if the ship had declared dangerous goods 48 hours before arriving at Port Klang and whether the ship had fulfilled the safety precautions of dangerous goods. Other potential HNS pollution could arise from the threats of unnamed groups planning to attack vessels carrying dangerous cargoes or oil tankers in the Straits of Malacca. 188 The capability to handle in anticipation any threats or incidents in the Straits of Malacca is crucial to the strait States to be proactive in securing the safety of navigation and to protect and preserve the marine environment from HNS pollution. In connection 183 International Maritime Organisation, Focus on IMO, IMO

and dangerous goods at sea, (London: International Maritime Organisation, 1996). 184 Muhammad Razif Ahmad, International Convention On Liability And Compensation For Damage In Connection With The Carriage Of Hazardous And Noxious Substances By Sea, 1996, Maritime Institute of Malaysia, 26 August 1997. Detail of accident is not available. 185 Malaysia, Department of Environment, (Putrajaya: Department of Environment). 186 Charles Lim, Aeng Cheng, "Environmental Protection Of The Seas In Singapore" , (1994) Singapore Journal of Legal Studies 52-90. 187 V. Shankar Ganesh and R. Anbu, "Chemical-laden ship sinks after huge explosion", New Sunday Times, 19 October 2008, at 4. 188 International Spill Control Organization Newsletter, "Singapore warns of threat to tankers in Malacca Strait" Issue 222 8 March 2010, < <http://www.spillcontrol.org>> , 14 April 2010, 4 pm. with this matter, the Malaysian Armed Forces and Indonesia's National Army have started their inaugural two-week joint anti-terror military exercise to beef up regional security from all three branches; land, sea and air training exercise in combating terrorism. 189 The Malaysia Armed Forces Chief Jeneral Tan Sri Azizan Ariffin said that since 11 th September 2001, a new dimension and threat exist that could affect the global strategic balance and this region was not spared the threat of terrorism. 190 It was reported that there has never been a terrorist attack in the Straits of Malacca. 191 Meanwhile the Straits suffered piratical attacks five to seven years ago, but it has been eradicated now. 192 The International Maritime Bureau (IMB) piracy reporting centre head, Noel Choong said, the number of piracy was less mainly due to increased patrols and surveillance by the litoral States of Indonesia, Malaysia and Indonesia. 193 Recently, on 26 th May 2010, a tanker (MT Bunga Kelana 3, a Malaysian- registered tanker) and a bulk carrier (MV Waily, a St. Vincent and The Grenadines-registered bulk carrier) collided and caused more than 2000 tonne oil spill 194 off the Strait of Singapore. 195 This incident happened in the Traffic Separation Scheme (TSS) from the tip Singapore. 196 This latest spillage incident indicates that although the ships were navigating within the prescribed passage (TSS), the possibility of encountering collisions still exists. The Malaysian Maritime Enforcement Agency (APMM) said there was no report of injury to crew members and the cause of the collision was still being investigated. 197 The Maritime 189 "Anti-Terror exercise with Indonesia begins", The Star, 3 April 2010, N16. 190 Ibid. 191 "Fewer piracy due to increased patrols", New Straits Times, 6 March 2010, 9. 192 Ibid. 193 Ibid. 194 The Maritime and Port Authority of Singapore will not tap into pooled fund resources-such as the Revolving Fund-to offset the cost of the final clean-up bill for oil spill off the Changi coast,http://www.straitstimes.com/BreakingNews/Singapore/Story/STISStory_532286.html, 31 May 2010,3 pm. 195 "Tanker and bulk carrier collide", The Star, 26 May 2010, N4. 196 Ibid. 197 Ibid. and Port Authority of Singapore said it is co-ordinating the containment and clean-up efforts of the oil spill 198 and is working with the Indonesian and Malaysian authorities in line with the Standard Operating Procedure for Joint Oil Spill Combat in the Straits of Malacca and Singapore. 199 The recent spillage of oil reported that the beach near Teluk Ramunia was polluted and the oil spill spread to Tanjong Punggai, Sungai Rengit, Langkah Baru, Sungai Buntu, Sungai Kapal and Sungai Musuh, which areas are the main locations for fish and prawns. 200 Meanwhile, ships and vessels that docked around the waters of Teluk Ramunia are alleged to have taken advantage of the massive oil spill to illegally dump their oily waste into the sea. 201 Some 400 fishermen's livelihoods were affected by the oil spill and the Malaysian Fisheries Development Board together with the Ministry for the Environment and Natural Resources have to work out a compensation package for them. 202 HNS spillages or other accidents are critical to the Straits of Malacca as certain portions of the Strait of Malacca are narrower than (twenty four) 24 nautical miles. 203 Although the volume of chemicals transported by sea is significantly lower than the seaborne trade in oil, it is nevertheless increasing. 204 The consequences of a chemical spill can be more wide reaching than that of oil and there is a growing international awareness of the need for safe and effective contingency arrangements for chemical spills. 205 The wide 198 It was reported that the oil slick in the Strait of Singapore has spread to Tanjong Ayam, Pengerang, Johor, Malaysia. The Johor Department of Environment with the cooperation of the Southern Region Marine Department are installing booms at the affected area. The Singapore Maritime and Port Authority is actively cleaning the slick by sucking the oil into the empty tanks of MT Bunga Kelana 3. Zolkepli, Farik, "Singapore oil spill spreads to Malaysian waters" , The Star, 28 May 2010, N10. 199 "Tanker and bulk carrier collide", The Star, 26 May 2010, N4. 200 Ben Tan and Syed Umar Ariff, "Oil sludge hits 30km of Johor beaches", New Sunday Times, 30 May 2010,13. 201 Ibid. 202 Ibid. 203 For example, between Tanjong Tohor (latitude 1 51 N) on the Malaysian side and Tanjong Parit on the Indonesian side, the fairway narrows to a width less than 26 miles over a distance of about 11 miles. Facts taken from Ahmad, Hamzah ,ed., The Straits of

Malacca, International Co-Operation In Trade, Funding & Navigational Safety, (Petaling Jaya, Pelanduk Publication, 1997), at page 128. 204 Bateman Sam, Ho Joshua, Chan Jane, "Good Order At Sea In Southeast Asia" S.Rajaratnam School of International Studies, Nanyang Technological University, Policy paper, 2009. 205 Ibid. variety of chemicals transported, their varying physical and chemical properties, the different ways in which they behave in the environment and the potential for effects on human health mean that response to chemical spills is not straightforward as oil. 206 Despite the damage that a spill of hazardous and noxious substances can cause to human health, living resources and marine life, the response measures to a potential chemical spill in the region is weak or non-existent. 207 2.7.1 HNS Pollution The quality of the marine environment based from chemical pollution in the Straits of Malacca has been highlighted by a Malaysian scientist who predicted that the Straits will soon become a dead sea if efforts to curb pollution from land-based sources and from ships were not effective. 208 Research conducted by particular scientists from Universiti Putra Malaysia detected the existence of chemical pollution such as arsenic, beryllium, cadmium, lead, manganese, nickel, selenium, nitrate, copper and mercury in the Straits of Malacca because of its role as a shipping lane and as receiving wastes due to land based activities along the west coast of Peninsular Malaysia. The research also pointed out that the Straits of Malacca is an interesting area for exotoxicology studies because of its role as a shipping lane and as receiving wastes due to land based activities along the west coast of Peninsular Malaysia. 209 The role of the Straits of Malacca as a shipping lane creates great fears of chemical pollution in the Strait of Malacca. 210 Henceforth, in future a lot of studies need to be done by the scientists 206 Ibid. 207 Bateman Sam, Ho Joshua, Chan Jane, "Good Order At Sea In Southeast Asia" S. Rajaratnam School Of International Studies, Nanyang Technological University, Policy Paper, April 2009. 208 Ahmad, Hamzah, ed., op. cit., 127. 209 C.K.Yap, A.Ismail, K.Misri & S.G.Tan, "Nitrate Concentration in the Surface Seawater of the Straits of Malacca", Asian Journal of Water, Environment and Pollution, IOS Press, Volume 2 Number 2/2005, 45-49. 210 Ismail, Ahmad, "Studies on Hazardous Chemicals Along the Strait of Malacca and Their Ecological Effect", The 3 rd UNU-ORI Joint International Workshop for Marine Environment-Coastal Ecology, Nutrient Cycles and Pollution, (Otsuchi, Japan, 21-26 October 2001). 74 involving the chemistry of hazardous chemicals, the biology and ecology of organisms related to chemicals, the effects of the chemicals on organisms at an ecological, individual and molecular level. 211 Hazardous chemicals input into the ecosystem may disturb the quality of the products of fisheries and inevitably human health. 212 The chemicals that are known to contaminate the marine environment include endocrine disruptors. 213 An endocrine disruptor means something that disrupts the endocrine process (the process of glands sending and receiving hormones). 214 These chemicals act as if they were hormones but actually they are not, they can block, excite or inhibit. 215 The examples of endocrine disruptors are heavy metals (example of the metals are arsenic, beryllium, cadmium, lead, manganese, nickel and selenium 216), pesticides (pest killers), insecticides (insect killers), herbicides (weed killers), fungicides (fungus killers), plastics and solvents. 217 The example of the chemicals discussed above is included in the HNS list. Nitrate concentration, a chemical pollutant, is also found in the Straits. 218 Three cruise samplings of nitrate were conducted from November 1998 to April 1999 from northern to southern parts of the Strait. 219 The concentrations ranged from 0.01 to 0.07 mg/L, 0.01 to 0.08 mg/L, for samples from the first, second and third cruise, respectively. 220 These offshore nitrate concentrations were much lower than those found 211 Ismail, Ahmad, "Studies on Hazardous Chemicals Along the Strait of Malacca and Their Ecological Effect", The 3 rd UNU-ORI Joint International Workshop for Marine Environment- Coastal Ecology, Nutrient Cycles and Pollution, (Otsuchi, Japan, 21-26 October 2001). 212 Ibid. 213 Ibid. 214 <http://www.natural-weight-loss-myths-revealed.com/endocrine-disruptors.html> 15 April 2010, 9am. 215 Ibid. 216 Metals are called "heavy" because of their high relative atomic mass which persist in nature and can cause damage or death in animals, humans and plants even at very low concentration (1 or 2 micrograms in some cases). Used in industrial processes, they are carried by air and water when discharged in the environment. Since heavy metals have a propensity to accumulate in selective body organs (such as brain and liver) their prescribed average safety levels in food or water are often misleadingly high. <http://www.businessdictionary.com/definition/heavy-metal.html> 16 April 2010, 9 am. 217 Ibid. 218 Ibid. 219 Ibid. 220 Ibid. for several coastal waters (0.17-0.33 mg/L) of Peninsular Malaysia, a groundwater sample (0.88 mg/L) and other reported studies showed. 221 Although the background nitrate concentrations from the present study indicated that the nitrate contamination in the Straits of Malacca is not serious, future monitoring of nitrate along the

Straits of Malacca is needed since it can pose ecotoxicological to living biota. 222 Nitrate is included in the list of HNS. Another research study showed the chemical pollutant copper in the Straits of Malacca. 223 Copper is ranked the third most toxic metal to aquatic biota, after mercury and silver. Copper is included in the list of HNS. The geochemical partitioning of copper in surface sediment of two sampling cruises from the Straits of Malacca has been studied. 224 The result of the study indicated that the total concentration of copper in sediments were relatively low, the geochemistry study revealed that about 50% of the total copper found in the sediment could be due to anthropogenic 225 inputs besides natural origins. 226 A study of mercury in zooplankton was conducted through samples taken from 14 stations along the Straits of Malacca. 227 Zooplankton means the community of floating, often microscopic, animals that inhabit aquatic environment. 228 Being near the base of 221 Ibid. 222 Ibid. 223 C.K.Yap, A.Ismail and S.G.Tan, "Concentration, Distrubution and Geochemical Speciation of Copper in Surface Sediments of the Straits of Malacca" Pakistan Journal of Biological Sciences 6 (12): 2003. ISSN 1028-8880, 1021-1026. 224 Ibid. 225 Anthropogenic means referring to things, events, or actions whose origins can be traced to the activities of individual people or human groups. <http://www.answers> 18 April 2010, 10am. 226 C.K.Yap, A.Ismail and S.G.Tan, "Concentration, Distribution and Geochemical Speciation of Copper in Surface Sediments of the Straits of Malacca" , Pakistan Journal of Biological Sciences 6 (12):2003 ISSN 1028-8880, 1021-1026. 227 H.Rezai, F.M. Yusoff & C.K.Yap, "Mercury in zooplankton from the Malacca Straits", Indian Journal of Marine Sciences, Vol.32(3), September 2003, pp. 240-243. 228 <http://www.sbaa-ca/glossary.asp> 18 April 2009, 11 am. the food chain, they serve as food for larger animals such as fish. 229 One liter of water can contain more than 125,000 zooplankton. 230 The study of zooplankton showed that the total mercury concentration in mixed zooplankton was determined from near surface waters in Malacca Straits. 231 Total mercury concentrations in mixed zooplankton ranged from 1.12 to 4.68 ng dry weight g⁻¹ and showed decreasing trend from nearshore to offshore areas. 232 Higher mercury concentrations were found in nearshore waters. 233 Total mercury content was higher in the southern part of the Straits compared to the other parts. 234 The zooplankton in the Malacca Straits environment is not heavily contaminated with mercury. 235 Apart from the above mentioned chemical pollution generated from land based pollution extracted from the list of the 1996 HNS Convention, there is other type's chemical pollution caused by the anti-fouling paints used to coat the bottoms of ships which are dealt with in a different convention. Although this chemical pollution does not come under the list of HNS, it is important to add another type of chemical pollutant that exists in the Straits of Malacca. Thus, anti-fouling paints are also a contributing factor to the chemical marine pollution in the Straits of Malacca. In the modern chemicals industry, the shipping industry has developed effective anti-fouling paints using metallic compounds. 236 Anti-fouling paints are used to coat the bottoms of ships to prevent sea life such as algae and mollusk attaching them to the hull and thereby 229 Ibid. 230 Ibid. 231 H.Rezai, F.M.Yusoff& C.K. Yap, "Mercury in zooplankton from the Malacca Straits", Indian Journal of Marine Sciences, Vol 32 (3), September 2003, pp.240-243. 232 Ibid. 233 Ibid. 234 Ibid. 235 Ibid. 236 <http://www.imo.org> 18 April 2010, 4.30 pm. slowing down the ship and increasing fuel consumption 237 . These compounds slowly "leach" into the sea water, killing barnacles and other marine life that have attached to the ship. 238 But the studies have shown that these compounds persist in the water, killing sealife, harming the environment and possibly entering the food chain. 239 One of the most effective anti-fouling paints, developed in the 1960s, contains the organotin tributyltin (TBT), which has been proven to cause deformation in oysters and sex changes in whelks. 240 The convention that prohibits the use of harmful organotin in anti-fouling paints used on ships is the International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001. 241 It was reported in a research that port activities also result in the contamination of the Straits of Malacca of tributyltin (TBT) arising from the use of anti-fouling paints used on ships which frequent the ports. 242 The research conducted by the scientists showed the existence of chemical pollution in the Straits of Malacca. A study done by the Ministry of Land, Infrastructure and Transport of Japan projected that the volume of cargo will increase to 4.7 billion tonnes in 2010 and to 6.4 billion tonnes in 2020. 243 However, the current economic recession and downturn in international shipping may lead to a revision of these projections. 244 It is a well-known fact that the Straits of Malacca is significant and beneficial to the economy of Malaysia as Malaysia's commerce and industry, major ports, export outlets, population centers, 237 Ibid. 238 Ibid. 239 Ibid. 240 Ibid. 241 The International Convention on the Control of Harmful Anti-fouling Systems on Ships enters into force on 17 September 2001. To date Malaysia and Indonesia have not ratified the convention except for Singapore. <http://www.imo.org> , Status of

Conventions as at 31 January 2010. 242 Abdullah, Abd Rani, Mohd Tahir Norhayati, Tong Soo Loong, Mohd Hoque Tafazzal and Sulaiman Abd Halim, "The GEF/UNDP/IMO Malacca Straits Demonstration Project: Sources of Pollution", Marine Pollution Bulletin Vol. 39 Nos 1-12, pp.229- 233, 1999. 243 Ibid. 244 Ibid. agriculture, commercial fisheries and fishing population are concentrated at the coast facing the Straits. 245 Three considerations are relevant here: first, to enhance safety of navigation, second to protect the marine environment and thirdly, to protect the marine resources within the

1 **Straits of Malacca and** a handling project **to** understand **the**

hydrology of the strait. 246 Traffic

1 **through the Straits of Malacca** is said to **be**

ten (10) times greater than through the Panama Canal and more than four (4) times greater than through the Suez Canal. 247 Besides that, the vessels prefer to navigate through the Straits of Malacca because it is outfitted with reliable navigational aids, well-policed and Singapore provides excellent support facilities for vessels as well as cheap bunker fuel. 248 Singapore is the world's largest bunkering port and Asia's top oil trading hub. 249 The advantages provided by Singapore attract ships to navigate along the Straits of Malacca instead of using the alternative straits such as The Makassar and Lombok Strait. 2.7.2 Land-based sources of HNS pollution in Malaysia: The major sources of land-based pollution are agricultural and industrial waste, domestic sewage, solid waste, and chemical and hazardous waste. 250 Below are the categories of waste, their sources and the description of the wastes based on the Quarterly Report of the Department of Environment, Development & Sustainability. 245 Ahmad, Hamzah, ed., op. cit., 13. 246 Basiron, Mohd Nizam, "Sharing The Costs Of Enhancing Safety And Protecting The Environment Of The Straits Of Malacca And Singapore: Some Basics Ideas", Symposium On The Enhancement Of Safety Of Navigation And The Environmental Protection Of The Straits Of Malacca And Singapore, (Kuala Lumpur, 13-14 March 2007) . 247 Sasakawa, Yohei," Development Toward a New World Maritime Community", Symposium On The Enhancement Of Safety Of Navigation And The Environmental Protection Of The Straits Of Malacca And Singapore, (Kuala Lumpur, 13-14 March 2007). 248 Ahmad, Hamzah ,ed., op. cit., 4. 249 Ahmad, Hamzah ,ed., op. cit., 4. 250 Ibid. SOURCE OF WASTE Organic aqueous waste Inorganic aqueous waste Oily waste Organic liquids Table 2.7: Waste Categorization based on chemical composition. 251 DESCRIPTION Waste of biological origin which can be in liquid or sludge forms. Broadly speaking, there are two types of organic waste: biodegradable wastes which break down readily in the environment such as food and garden waste; and persistent wastes which are those that do not readily break down and can persist in the environment for many years. Persistent organic waste can be hazardous. Waste of non-biological origin which can be in liquid or sludge forms. Inorganic can be either metal or non-metal. Metals include heavy metals. Non-metals include cyanide and arsenic. Inorganic waste is often hazardous, and may also include chemically and biologically inactive waste. Liquid waste consists of petroleum-derived oils. Liquid waste consists of non-aqueous solutions or spent solvents. Table 2.7 describes that waste categorizations are based on organic aqueous waste, inorganic aqueous waste, oily waste and organic liquids. Table 2.7.1 explains that waste categorizations are based on inert, non-hazardous, radioactive and hazardous waste. The most relevant to this thesis is the hazardous waste which can cause death, injury or impairment to living organisms and the natural environment, mostly generated by industrial industries. Table 2.7.1: Waste categorization based on reactivity and environment risk 252 SOURCE OF WASTE Inert Non-hazardous Radioactive DESCRIPTION Inert waste refers to waste that is chemically and biologically inactive (i.e. non-biodegradable). Typical wastes include masonry and brick rubble, uncontaminated soils, ash (excluding that from incinerators) glass and plastics. Much of mining and construction waste is inert waste. A general description of waste including municipal, commercial and industrial, which is not hazardous Radioactive waste is waste which contains substances that emit ionizing radiation. Principal sources of radioactive waste include hospitals, nuclear power plants and industrial facilities. Nuclear (radioactive)

waste is 251 Harun, Rosta, "Waste", Quarterly Department of Environment Update on Environment, Development & Sustainability, Issue 2/2006, <http://www.doe.gov.my>. 252 Ibid. Hazardous generated at various stages of the nuclear fuel cycle (uranium mining and milling, fuel enrichment, reactor operation, spent fuel reprocessing). It also arises from decontamination and decommissioning of nuclear facilities, and from other activities using isotopes, such as scientific research and medical activities. A general description of waste which contains a toxic or harmful substance in such quantity as to cause death, injury or impairment to living organisms and the natural environment. Typical hazardous wastes include organic sludges (human and animal), contaminated soils, infectious, clinical/surgical waste, heavy metals and industrial waste. Hazardous waste is mostly generated by industrial activities. It represents a major concern as it entails serious environmental risks if poorly managed; the impact of environment relates mainly to toxic contamination of soil, water and air. Table 2.7.2 describes that sources of waste generated based on municipal, commercial, clinical waste, industrial waste, construction waste, mines and quarries and agriculture. Industrial waste types include liquid, gaseous or solid forms. The 1974 EQA classifies wastes into five categories according to physical nature of a particular waste, namely: scheduled waste (usually considered as solid, but need special treatment due to their hazardous nature, and the term refers to 107 types of wastes, listed in the First Schedule to the Environmental Quality [Schedule Wastes] Regulations, 1989. 253 Marine water quality monitoring is important for the conservation of marine resources which contribute to the stability and diversity of the marine ecosystem. The Department of Environment started the marine monitoring program in 1978 for Peninsular Malaysia and in 1985 for Sabah and Sarawak. The program included in-situ measurements and laboratory analyses for parameters as listed in Table 2.8 The Interim Marine Water Quality 253 Ariffin, Mariani, "Hazardous Wastes and Illegal Dumping in Malaysia: An Overview" [2007] 3MLJ clx; [2007] 3 MLJA 160. Table 2.7.2 Waste categorization based on source of generation 254 SOURCE OF WASTE Municipal Commercial Clinical waste Industrial Construction Mines and Quarries Agriculture DESCRIPTION Municipal waste is produced by a municipality and includes households, commercial office buildings, institution and hospital waste. Principal sources of commercial waste are premises used wholly, or mainly, for the purposes of a trade or business, sport, recreation or entertainment purposes. Clinical waste can be hazardous to persons coming into contact with it. Principal sources of clinical waste are medical, nursing, dental, veterinary or pharmaceutical facilities Industrial waste includes metals, electronic components, hazardous and non-hazardous materials. Principal sources of industrial waste are facilities which undertake manufacturing processes of consumer products. Principal sources of construction waste include excavation and demolition activities Wastes from mines and quarries are generated during blasting, excavation and dredging. Most mining or quarry waste is inert: however, hazardous waste can also be generated. Principal sources of waste are any farming activities or agro-industry, such as abattoirs and tanneries WASTE COMPOSITION Waste generally contains putrescible matter such as food waste, glass, paper, plastics. Bulky waste is yard and garden waste, street sweepings, content of litter containers, and market cleansing General office waste, packaging waste and plastics Waste that consists partly or wholly of human and animal tissue, blood or other bodily fluids, excretions, drugs or other pharmaceutical products, swabs or dressings, or syringes, needles or other sharp instruments. Organic or inorganic types of wastes either in liquid, gaseous or solid forms. Construction waste is mainly inert in nature and includes rocks, topsoil, vegetation, timber, concrete, bitumen tarmacadam and liquid waste. Waste includes rocks, spoil, timber, metal tailings and liquid waste (e.g. flushing containing nitrates, heavy metals and acids) Waste includes organic sludge effluents, unused pesticides and fertilizers, chemical containers and crop residues. 254 Ibid. Table 2.8.1 Malaysia: Status of Marine Water Quality Parameters Exceeding Standards (%), 2006. Table 2.8 observes that through samplings taken, cadmium, chromium, mercury, lead, arsenic and copper were found in the Malaysian marine waters confirming the existence of HNS. 2.8 FINANCES The strait States have to contribute financially and technically towards enhancing the safety of navigation in the Straits. According to H.M.Ibrahim, more than half the vessels using the Straits do not call at any of the littoral State ports, thus these ports receive no direct benefit from their passage. 255 Yet, they bear the brunt of the burden of maintaining the safety of navigation. 256 The strait States are under an obligation to protect and conserve the marine environment within the strait as their economic activities depend heavily on the Straits of Malacca. In most cases, Japan, unlike other user States, has generously contributed financially and technically in managing the marine environment and safety of navigation in the Straits. For over forty years, The Nippon Foundation has given more than

US\$125.5 million towards the enhancement of safety, security and protection in the Straits of Malacca and Singapore. 257 User States too have gained benefits and saved costs in their businesses by navigating through the Straits. Malaysia's Deputy Prime Minister (as he was then), now the Prime Minister, Dato' Sri Najib bin Tun Abdul Razak, would like to see greater contributions from the user States: "It is regrettable that international users have thus far not matched their usage of the straits with contribution to the costs of maintaining its safety and 255 H.M.Ibrahim, "Straits safety not just littoral states' burden", New Straits Times, 25 November 2008, 22. 256 Ibid. 257 The Nippon Foundation is a private, non-profit foundation established in 1962. Its objectives include assistance for humanitarian activities, both at home and abroad, and global maritime development. EnergyAsia, MALAYSIA: Intertanko lauds "high level" support for shipping symposium on November 24 18 th November 2008, 27 th February 2009 (date of access)<<http://www.energyasia.com/content/view/16225/27/> . security." 258 A commentator added "the cost of ensuring the safety and protection of the straits was not borne fairly and equitably although the straits continued to be among the most important trade route in international maritime transportation." 259 2.9 IMPLICATIONS FOR MALAYSIA AND CONCLUSION This chapter pointed out that the Straits of Malacca is undeniably important to Malaysia. The present status quo of the Straits is that HNS shipping is an uncontrolled activity enjoyed by user States. There is a tremendous increase in the number of HNS ships in the Straits with a strong possibility for shipping accidents being ever present even though traffic separation schemes do exist in the Straits. Except for recommendations on the adoption of TSS meant to improve safety of navigation, strait States have not imposed or exercised any form of direct control over these ships. At the same time, the Straits deserve legal protection under the 1982 LOSC. Other measures that Malaysia needs to undertake relate to the standards of safe HNS shipping, control of HNS marine pollution, protection of marine resources, the necessity to undertake scientific research in HNS pollution, spill containment preparedness and response action plans, liability and compensation for HNS spill victims, adoption of a sub-regional response action plan for HNS pollution, and adoption of municipal law regulating HNS. These are all addressed in various international conventions addressed and evaluated in the next chapter, Chapter Three. 258 "User straits but help pay for security", New Straits Times, 14 March 2007,5. 259 "Special fund plan to secure smooth sailing in straits ", New Straits Times, 15 March 2007, 8.

2.8.1 Marine water quality monitoring

STATE NO.	STATION NO.	OF SAMPLE	TOTAL SUSPENDE D SOLIDS	OIL & GREASE	E. COLI	CADMIUM	CHROMIUM	MERCURY	LEAD	ARSENIC	COPPER
Perlis	2	16	64	43	100	7	0	50	0	0	0
Pulau Langkawi	7	35	94	17	43	0	0	23	0	0	9
Kedah	3	14	100	14	100	0	0	79	14	0	0
Pulau Pinang	25	191	74	10	78	0	2	26	9	0	0
Perak	13	52	100	12	64	0	0	NA	56	0	0
Selangor	14	49	98	54	68	0	0	11	0	0	0
Negeri Sembilan	13	78	100	68	83	0	0	16	0	0	0
Melaka	9	28	92	20	66	0	NA	NA	0	NA	0
Johor	51	122	60	11	49	0	0	10	13	1	9
Pahang	11	80	19	80	10	0	0	0	40	0	0
Terengganu	19	76	74	93	46	11	0	2	86	0	42
Kelantan	10	40	73	59	43	10	0	3	78	10	30
W.P.	5	20	60	0	25	0	25	NA	0	NA	0
Labuan	26	111	35	0	25	1	0	0	6	NA	3
Sarawak	21	123	78	49	25	0	0	0	2	0	0
Malaysia	229	1035	(Total)	Average (%)	75	35	55	2	2	18	20
					1	6	32	33	34	35	36
					37	38	39	40	42	43	44
					45	46	47	49	51	52	54
					55	56	57	58	59	60	61
					62	63	64	65	67	68	70
					71	72	73	75	76	77	78
					79	80	81	82	83	84	85
					86						