8-23-2015

Study on the application of special area legal system in the Bohai Sea

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STUDY ON THE APPLICATION OF SPECIAL AREA LEGAL SYSTEM IN THE BOHAI SEA

By

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The People's Republic of China

A research paper submitted to the World Maritime University in partial Fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE

(MARITIME SAFETY AND ENVIRONMENTAL MANAGEMENT)

2015

DECLARATION

I certify that all the materials in this research paper that are not my own work have been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this research paper reflect my own personal views, and are not necessarily endorsed by the University.

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Date: 9th July 2015

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ACKNOWLEDGEMENTS

As the last but important part of my study life at Dalian Maritime University (DMU), this thesis would not have been accomplished without the generous support. I am profoundly grateful to all people who have supported and helped me in various ways during my studies.

My sincere and heartfelt gratitude first goes to my respectable supervisor Professor Zhang Renping whose illuminating instructions and invaluable suggestions have help me finish this thesis, I also appreciate the help of all the professors who attended the Maritime Safety an Environment Management (MSEM) 2015 program for their direct and indirect help for me. Their professional teaching equips me with the basic abilities to do the research independently.

I also owe my dear professor Du Dachang and my friends Sun Yanze and Gai Xiaozhi a great lot. They give me some unexpected ideas and suggestions during the research.

Finally, I would like to express my gratitude to my beloved family who give me all the love and support I need to be happy and successful in life.

Title: Study on the Application of Special Area Legal System in the Bohai Sea

Degree: MSc

ABSTRACT

The 21st century has been called the Ocean Century, the relationship between humans and the ocean is becoming increasingly close. With the population growth and economic development, the marine resources and environment have been seriously damaged (Liu, 2013). As the only semi-enclosed sea in China, the Bohai Sea is facing more serious damage than other sea in China due to its special geographic location as well as economic and social development, which not only affects the growth of marine organism but also produces a negative impact on the economic development of the coastal areas. The Chinese government has adopted some measures to control the pollution, but they have not attained the ideal effect due to some limitation. Pollution in the Bohai Sea is still worse, and the ship pollution is one of the most important reasons (Li, 2003). Some scientists deduced that if there is no effective measure taken, the Bohai Sea may become the Dead Sea in the next decade (Zhou, Wen & Zhang, 2006).

The paper firstly analyzed the necessity of the Special Area (SA) legal system for the Bohai Sea based on the analysis of the polluted condition and the important effect on Chinese society and economy as well as the problem of the existing ship pollution prevention legal system in Bohai Sea. Then proposed three legal measures, national legislation, designation of the Bohai Sea as a SA, designation of the Bohai Sea as Particularly Sensitive Sea Area (PSSA), to control the ship pollution to the Bohai Sea and determined the most suitable method for the actual situation of the Bohai Sea through the analysis of advantages and disadvantages of each method. Finally discussed the feasibility analysis of the designation of the Bohai Sea as a SA and proposed some additional measures to ensure the SA legal system to be effectively implemented in the Bohai Sea.

Key words: Ships, Bohai Sea, Environment Pollution, Special Area, Feasibility Analysis

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LIST OF ABBREVIATIONS

APM	Associated Protective Measure
ECA	Emission Control Areas
etc	and so on
IMO	International Maritime Organization
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto
MEPC	Marine Environment Protection Committee
MSA	Marine Safety Administration
NLS	Noxious Liquid Substances
OILPOL	International Convention for the Prevention of Pollution of the Sea by Oil 1954
PRC	People's Republic of China
PSSA	Particularly Sensitive Sea Area
SA	Special Area
SOA	State Ocean Administration
UNCLOS	United Nations Convention on the Law of the Sea 1982

Chapter 1 Introduction

1.1 Study background

Bohai Sea is a semi-enclosed sea of China. It is surrounded by Liaodong Peninsula, Shandong Peninsula and North China Plains. Since China adopted the reform and open policy, the Circum-Bohai Sea Region has been playing a tremendous role in the national economic and social development due to its special geographic location and abundant nature resources such as fisheris, oil gas, tourist, etc. However, with the fast economic development, the environmental conditions of the Bohai Sea have been drastically deteriorated and the pollutants such as oil, oily water, garbage, etc discharged by ships entering or leaving in the Bohai Sea are one of the important source..

The Chinese government, academic institutions and masses of people are all concerned about the seriousness of the Bohai Sea environment, and the government has taken a series of management measures, for example, the *Bohai Sea Blue Sea Action Plan, Regulations on lead-sealing Procedure for Pollution Prevention Equipment of Ships Operated within the Bohai Sea* to control the environment pollution of the Bohai Sea. However, generally speaking, the past management measures have not fundamentally changed the trend of Bohai Sea environmental deterioration. The main reason why these did not attain the ideal effect is that they ignore the particularity of the Bohai Sea as a semi-enclosed sea.

In this context, to find appropriate measures to solve the conflicts between economic development and the requirements of marine pollution prevention the Bohai Sea region is the key of this thesis.

1.2Study purpose

The purpose of the study is to give advice on the ship pollution prevention of the Bohai Sea from the legislative point of view. The study offers the status quo of marine

environment in Bohai Sea, the conflict between the existing ship pollution prevention legal system and the requirement of the pollution prevention from ships in Bohai Sea, the basic theory and specific description of the Special Area (SA) and also the feasible study of designation of the Bohai Sea as a SA, which will help relevant government departments have a clearer understanding of the serious pollution situation facing the Bohai Sea and may speed up the progress of the legislation for the Bohai Sea.

1.3 Methodology and main contents

The study carried out research by quantitative analysis, qualitative analysis and empirical approach. Through the quantitative analysis, the study analyzed the situation of the marine pollution of the Bohai Sea; using the qualitative analysis, the study analyzed the causes of such pollution and via the analysis of the international practice, the study found the conclusion that the SA legal system is the appropriate way to the current situation of the Bohai Sea. The main contents consist of 4 aspects:

.1 discussed the necessity of the SA legal system for the Bohai Sea from the environment protection point of view.
.2 discussed the necessity of the SA legal system for the Bohai Sea from the environment legislation point of view.
.3 introduced the criteria and procedures of the designation of a SA.
.4 discussed the feasibility analysis of the designation of the Bohai Sea as a SA and proposed some supplementary measures to ensure the SA legal system to be effectively implemented.

Chapter 2 Analysis of Ship Pollution in Bohai Sea

The special characteristics of the natural environment and the rapid development of the economic zone around Bohai Sea bring great challenges for the Bohai Sea pollution prevention. In addition to controlling the pollution from land-based source, controlling the pollutants such as oil, garbage, etc discharged by ships is another effective way for the marine environmental protection.

2.1 Main features of the Bohai Sea

2.1.1 Geographical features

Bohai Sea is a typical semi-enclosed sea, where most of the water is shallow, with an average depth of only 18 meters. As inland water, it is embraced on three sides by lands of three provinces and one city, Liaoning Province, Hebei Province, Tianjin City, Shandong Province and only the east connects to the Yellow Sea through the Bohai Strait as shown in Figure 1. Bohai Sea is shaped like a gourd, from south to north is about 480 kilometers, from east to west is approximately 300 km, and the area is about 77,284 square kilometers. There is a series of islands named Miaoqun islands dotted from north to south at the mouth of the Bohai Bay, which divides the Bohai Strait into 9 waterways. All of the 9 watercourses' widths are less than 24 nautical miles. The widest one, Laotieshan waterway is located between the tip of the Liaodong Peninsula and Beihuangcheng Island is 22.5 nautical miles. (Sun, 2006)

Due to its special geographic location and abundant natural resources, the Bohai Sea has been playing a great role in the economic and social development of the surrounding area. Since the reform and opening up, the marine industry of the Circum-Bohai Sea Region is developing at an unprecedented rate with an average annual growth rate of 25%. By the end of 2014, the total value of major marine industries including maritime transportation, coastal tourism, marine fisheries, etc of Circum-Bohai Sea Region is RMB 2215.2 billion, accounting for 37.0% of the total of

China (SOA, 2014b). Facts have proved that the Bohai Sea is in a pivotal position in China's economic and social development process. Thus the rational development of the Bohai Sea not only influences the economic development of the northern provinces, but also the national economy (Liu, 2013).

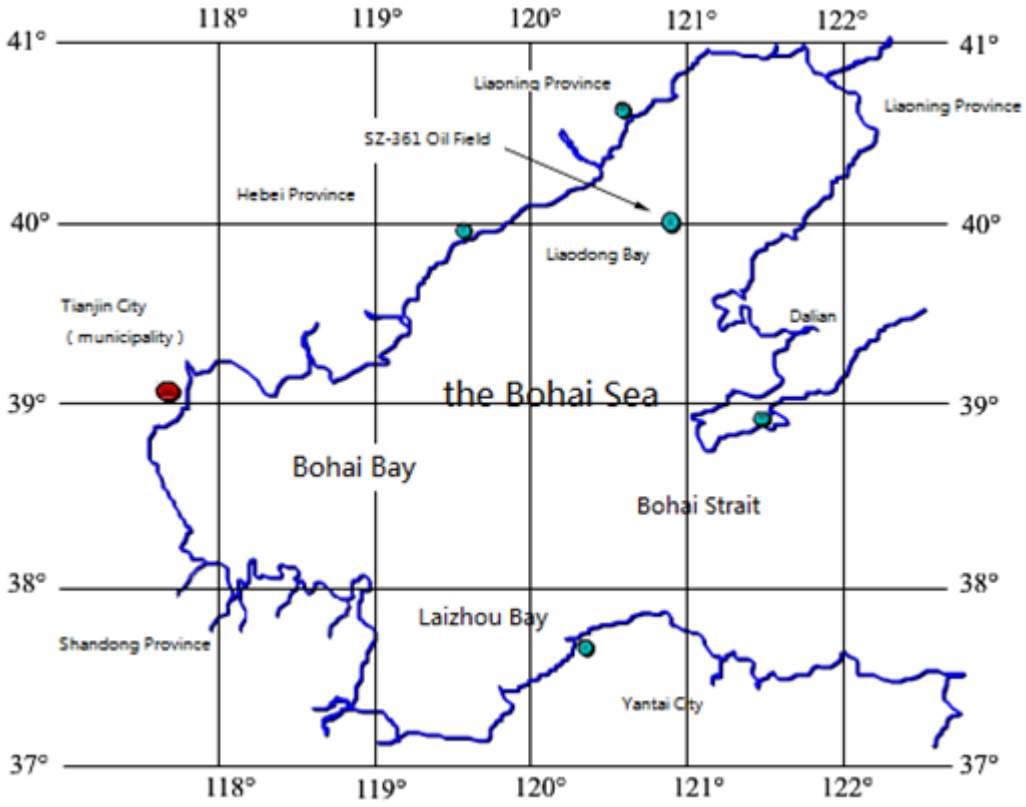

Figure 1-The Bohai Sea

Source: Sun, 2006

2.1.2 Hydrological and meteorological characteristics

2.1.2.1 Climate

The north winds are the prevailing winds on the Bohai Sea between every November and the next April, with the average speed of 6-7m/s and the maximum speed up to 30m/s. In spring, the wind direction is usually south or southwest, the mean speed of the winds in spring is about 4-6m/s. In summer, southeast monsoon is the majority, south and southwest monsoon coming next and sometimes the speed of the winds are more than 24.5-28.7m/s accompanied by heavy rains and violent unrest caused by

typhoon and cyclone which is the major summer severe weather. Monsoon is the most common in autumn and winter with the monthly mean speed is 5-6m/s. A hundred years statistics show that almost every year a tropical cyclone occurred in the Bohai Sea, of which 90% occur between July and August, followed by June to September (Wang, 2004).

2.1.2.2 Current and tide

Bohai Strait and the center of the Bohai Sea have the irregular semidiurnal tide current, the sea located at the west of the Miaoqun islands-Weihai and the sea around Longkou Port is the irregular diurnal current, while the sea around Yantai has the regular diurnal tide current. Laizhou Bay is a special case, with regular semidiurnal tide current in west and irregular semidiurnal tide current in east. The average current speed is between 20m/s and 80m/s, and the minimum appear at the tip of the Laizhou Bay while the maximum usually appear in the Laotieshan waterway, approximate 73m/s. At high tide, sea water comes into the Bohai Sea through the north of the Bohai Strait and a small portion of the water outflow through the south of the Straits, the flowing speed is basically about 50m/s, the flowing direction is the same from the surface to the bottom while the speed decreases. At ebb tide, the surface current is always flowing from the bottom of the Bohai Sea to the Bohai Strait, and finally flow to the shore near the Laizhou Bay. (Zhao, Tian, Chu, & Li, 2005)

2.1.3 Nature hazards

Cold wind is a severe weather, which is commonly called cold wave. Cold wave is a climatic phenomenon in Bohai Sea, with a big drop of temperature with northerly winds, which is caused by the cold air masses moving from the west or northwest of the Asian continent. Cold wave commonly occurs in late fall, winter, and early spring. It often results in a variety of dangerous situations, for example, dragging anchor, capsizing (Wang, 2004).

Storm surge is an abnormal rise of sea level caused by a tropical cyclone (mainly including typhoons, severe tropical storm and tropical storm) or an extratropical

cyclone (cold wave). The Bohai Sea is a semi-enclosed shallow sea with only east connecting with the Yellow Sea. When the north of the Bohai Sea and the Yellow Sea appear strong and lasting easterly wind, the sea water will continually gush into the Bohai Sea and cause storm surge in the Yellow River Delta and the Laizhou Bay (Wang, 2004).

2.1.4 Environmentally sensitive resources in Bohai Sea

The area of marine nature reserve in Bohai Sea is 1914,062 hectares, including nine national nature reserves where many national-level rare and endangered species live such as spotted maigre, Spanish mackerel, Penaeus orientalis, Amphioxus, etc. And the ecological environment of these reserves is extremely sensitive to changes in the marine environment.

In addition, Bohai Sea is an important fishery zone in the north of China, is a good area for spawning and breeding of many marine creatures such as fish, shrimp, crabs, etc. There are many fishing farms in the Bohai Sea, which are the main source of livelihood for coastal fishermen. And there are also plenty of tourist areas which are well known all over the world as their beautiful ocean views and soft beaches, such as Beidaihe Tourist Areas, Golden Coast, Dalian Tourist Areas, etc. (Zhang, Guan, Li & Dong, 2012)

2.1.5 The overview of ports in Bohai Sea

By the end of 2014, 79 ports had been constructed along more than 5000 km coastline of the Bohai Sea, which is like a capital letter “C” in sharp. The Ports in Bohai Sea can be divided into three port groups according to their geographical position, northeast port groups with the Dalian Port as the center, Shandong Port groups with the Qingdao Port as the center and Jinji port group with Tianjin port as the center (Shen, 2012).

With the rapid economic development of the circum-Bohai Sea, by the end of 2009 the circum-Bohai Sea has 5 ports with a capacity of 100 million-ton or more. They are

Dalian Port, Tianjin port, Qinhuangdao Port, Yingkou Port and Tangshan Port. Meanwhile, the throughput and the external trade of the port in Bohai Sea experience a steady increase (see Figure 2).

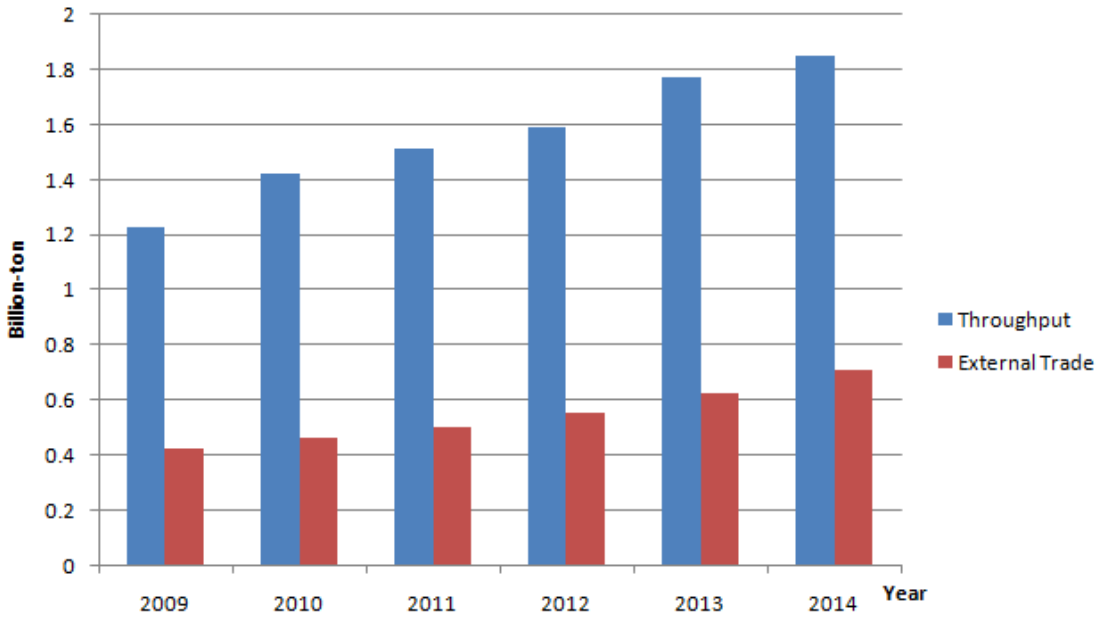

Figure-2 The throughput and the external trade of the ports around Bohai Sea

Source: Compiled by the author on the basis of date from the IT system of China MSA

Table-1 Ship flux in Bohai Sea from 2011 to 2014

Year	2011	2012	2013	2014	Average
Total voyage/ Thousand	703.39	707.64	692.62	718.43	705.52
International voyage/Thousand	47.47	47.27	48.05	48	47.7

Source: Compiled by the author on the basis of date from the IT system of China MSA

From Figure 2, we can clearly see that the throughput of the port in Bohai Sea steadily grew from approximate 1.23 billion-ton in 2008 to 1.85 billion-ton in 2013, and the number of the external trade in Bohai Sea also experienced a uptrend with the number increase from 0.42 billion-ton to 0.71 billion-ton. These two elements make the circum-Bohai Sea Region become one of the heavy shipping traffic areas in the world as shown in Figure 3. The China MSA's latest data (Table 1) shows that there are approximate 705.2 thousand ships entering or leaving the Bohai Sea each year from

2011 to 2014 and about 47.7 thousand was international voyage.

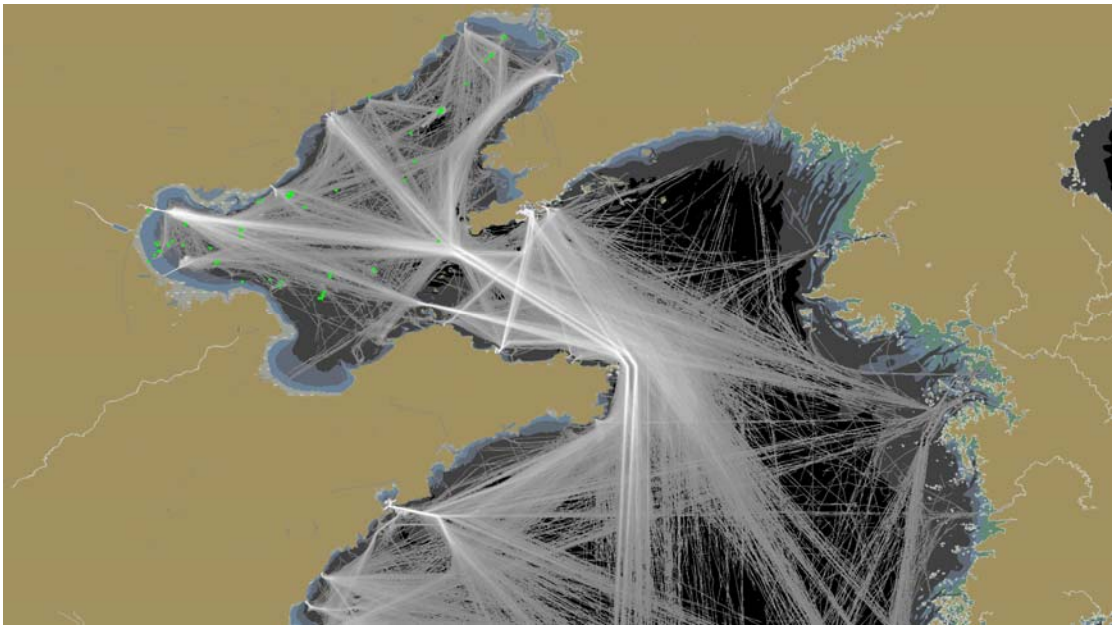

Figure-3 Contrail of the ships in Bohai Sea

Source: Shandong MSA VTS Center

2.2 The status quo of marine environment in Bohai Sea

The economic prosperity and social development of circun-Bohai Sea is closely linked with the environmental conditions of Bohai Sea. In the past 30 years since the adoption of the reform and open policy, along with the fast economic development of the circum-Bohai Sea, the environment condition of the Bohai Sea has been drastically deteriorated, resulting in decline of the water quality, imbalance of the ecosystem and the frequent occurrence of ecological disasters such as red tides, and the reduction of marine biological species (SOA, 2014a).

Table-2 The area of the Bohai Sea suffering serious pollution

YEAR	2010	2011	2012	2013	2014	Average
AREA/ m^2	3220	4210	13020	8430	5690	6217

Source: compiled by the author on the basis of date from the (SOA, 2014a)

From Table 2, we can conclude that the average area of the sea each year in which the

water quality standards below the fourth class in GB3097-1997 is 6217 square kilometers from 2010 to 2014, accounting for more than 8% of the total, particularly in 2012, the number is up to 16.9% with an area of 13020 square kilometers sea in serious pollution. The main pollutant is oil and garbage.

Table-3 The number and area of the red tides in Bohai Sea

YEAR	2010	2011	2012	2013	2014	Average
NUMBER	7	13	8	13	11	10.4
AREA/ m^2	3560	217	3869	1880	4078	2720

Source: compiled by the author on the basis of data from the (SOA, 2014a)

And as shown in table 3, during the past five years there have been, an average of more than 10 red tides per year affecting an area of 2720 m^2 of sea.

2.3 The characteristics of the Ship Pollution in the Bohai Sea

In addition to the land-based source, pollution caused by ships is the other major reason for the marine pollution of the Bohai Sea. And besides oil, the noxious liquid, sewage, garbage discharged by the ships also have serious impact on the marine environment in Bohai Sea.

2.3.1 Pollution from oil spills

Marine pollution from oil spill can cause not only greater economic losses, but also incalculable ecological and environmental damage. For example, in 2002, the “TASMAN SEA” spilled 206 tons of oil into the eastern coast of Tianjin Dagukou which brought serious impact to the surrounding sea water quality, sediments and marine organisms. The detection and analysis before and after the accident carried out by the State Oceanic Administration of China showed that one week after the accident, in the same area the dissolved oxygen concentration of the sea decreased by an average of 24.6%, COD concentration values increased an average of 73.7, Oil content increased by 1200% and the affected sea area was up to 200 square kilometers (Chen, 2013).

Over the years, the Bohai Sea marine environment has been suffering the oil spill from ships. And with the extraordinary development of the circum-Bohai Sea economic zone, the number of ships navigating in the Bohai Sea is sharply increasing, which makes the number of oil spills from ships show a rising trend. According to the related statistics, there were 79 oil spill accident (over 50 ton each time) in Chinese waters from 1973 to 2007, of which 26 occurred in Bohai Sea, accounting for 32.9% of the total (Ministry of Transport of the PRC. 2007).

2.3.2 Pollution from ship in normal operation

Annex I of the MARPOL 73/78 gives the list of oil including 8 categories and 44 items. Most of them are transported in Bohai Sea. Leaking is a common phenomenon in the process of loading and unloading for ships carrying oil, at the same time such ships will generate a greater amount of oil-containing ballast water and cleaning water, most of which are discharged into the Bohai Sea. In addition, all ships will generate a plenty of oily bilge water during their voyages, and according to the related conventions such oily water can be discharged into the sea after a certain treatment when they meet the certain requirement (15ppm). With over 700,000 ships entering or departing the Bohai Sea each year, the amount of oil-containing ballast water, cleaning water and oily bilge water discharged by them is very huge.

The noxious liquid substances (NLS) discharged or spilled by the ship are also one source for the Bohai Sea marine environment deterioration. In MARPOL 73/78 convention, Annexes II divide the NLS into 4 categories, X (major hazard), Y (hazard), Z (minor hazard) and Other Substances, all of which will pose harm of different degrees to the marine environment when they are spilled into the sea. And according to the relevant requirements of the Annex II, once the residues or mixtures of these substances including ship’s ballast water and cleaning water meet the certain emission standards, they can be discharged into the sea. In recent years, the NLS throughput of the ports in Bohai Sea has been increasing year by year, which poses more threats of harm to the marine environment.

Garbage discharged by ships during the normal operation is also one of the most important reasons for the deterioration of Bohai Sea marine environment. Here, the garbage means all kinds of victual, domestic and operational waste, including food waste, the products of metal, glass and pottery, plastic, dunnage, generated during the normal operation of the ship. Most of them would sink to the bottom of the sea, change the seabed sediments, and cause a serious impact on marine ecosystems.

Sewage means drainage from, toilets and urinals, medical units, live animal spaces, or other waste waters if mixed with the above. If such drainages are discharged directly into the sea without any appropriate treatment, they can also cause pollution damage to the marine environment of the Bohai Sea. In addition, the NOx, SOx, and particulate matters contained in the exhaust gas of the ship on one hand will cause air pollution; on the other hand they will cause marine environment pollution through atmospheric deposition, for instance, ocean acidification.

2.4 Chapter summary

Due to the special terrain (export narrow, internal diameter large) as well as the features of current and tide, Bohai Sea has the slow rate of water exchange capacity compared with the other seas in China such as Yellow Sea, South China Sea, etc (Sun, 2006). The relevant data from the State Oceanic Administration of China show that it will take at least 16 years for the Bohai Sea to complete a water exchange. It means that Bohai Sea is more vulnerable to disturbance and destruction by human activities. It also means that the same amount of human activities will bring more harm to the Bohai Sea, for example, frequent occurrence of red tides, the serious recession of marine biological resources, etc.

In recent years, with the development of the Bohai Sea economic zone, seaborne trade in this region has grown by leaps and bounds, which makes the circum-Bohai Sea Region become one of the heaviest shipping traffic areas in the world. According to the relevant international conventions and Chinese laws, once the oily water, garbage, oily cleaning water or other pollutants, generated during the normal operation of the ship，meet the certain discharge standards, they can be discharged into the sea except

the special areas designated in MARPOL. These two reasons lead to the fact that the amount of pollutants discharged by ships is growing year by year, which has a seriously impact on the marine environment of the Bohai Sea. Even some coastal waters of the Bohai Sea have exceeded its purification capacity, reaching the critical point. The environmental problems of the Bohai Sea have seriously hampered the economic development of the Circum-Bohai Sea Region, and have attracted the widespread attention from the public. So it is urgent and significant to take effective measures to prevent ship pollution in Bohai Sea immediately from the perspective of maritime environment pollution prevention.

Chapter 3 Analysis of the Existing Bohai Sea Ship Pollution Prevention Legal System

3.1 The existing legal instruments for marine pollution prevention in China

The establishment of ship pollution prevention legal system in China can be traced back to the 1970s. In January 1974, Chinese government promulgated the *Provisional Rules of Preventing Coast Water Pollution of the People's Republic of China (PRC),* which set the standards for the pollutant discharged by ships, the pollution prevention document formats and so on. With the promulgation and implementation of *The Regulations Concerning the Prevention of Pollution of Sea Areas by Vessels of the PRC,* China's ship pollution prevention work is gradually on the right track. Currently, the China's ship pollution prevention legal system consists of five levels, the international conventions to which Chinese government acceded, national law, administrative regulations, departmental rules and normative documents (Shen, 2011).

3.1.1 The international conventions

The international conventions relevant to ship pollution prevention to which Chinese government acceded mainly include *MARPOL 73/78, CLC 1992, London Convention, International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969* and *International Convention on Oil Pollution Preparedness, Response and Co-operation,* of which the MARPOL 73/78 is the most important international convention related to ship pollution prevention. Recently all six annexes have entered into force in China.

3.1.2 National law

Currently, the national laws related to the pollution of ship are Environment *Protection Law of the PRC, Marine Environmental Protection Law of the PRC, Law of the PRC on Prevention and Control of Water Pollution, Air Pollution Prevention*

and Control Law of the PRC and *Law of the PRC on Prevention and Control of Environmental Pollution by Solid Waste.*

3.1.3 Administrative regulations

The administrative regulations relevant to ship pollution prevention in China mainly include *Regulations Concerning the Prevention of Pollution of Sea Areas by Vessels of the PRC, Regulations of the PRC on the Control over Dumping Wastes into the Sea Waters* and *Regulations on Prevention of Environment Pollution by Ship Scraping of the PRC.*

3.1.4 Departmental rules and normative documents

Departmental rules and normative documents related to the ship pollution prevention are mainly issued by China MSA and local government in coordination with the local maritime sector, such as *Regulations on lead-sealing Procedure for Pollution Prevention Equipment of Ships Operated within the Bohai Sea, Regulations Concerning the Prevention of Pollution of Sea Areas by Vessels of the Hebei province, Regulations for the Prevention of Pollution by Garbage from Ships in Yantai port* and so on.

3.2 The conflict between the existing ship pollution prevention legal system and the requirement of the pollution prevention from ships in Bohai Sea

The existing ship pollution prevention legal system does not meet the requirement of the pollution prevention from ships in Bohai Sea, because so far China's current laws related to the ship pollution prevention has been established for all waters of the country. They do not consider the geographical characteristics of the Bohai Sea as well as the special requirements arising there with respect to the characteristics of the economy, the development of the society and the marine environmental protection, which are different from other waters in China like Yellow Sea. With the sustained and rapid economic development of the Circum-Bohai Sea economic zone, such

conflict was worse in the last decade.

Firstly, the existing ship pollution prevention laws and regulations do not consider the slow rate of water exchange of the Bohai Sea resulting from its special geographical position. Since the Bohai Sea is a semi-enclosed sea with the Miaoqun islands lined along the mouth of the Bohai Bay, there is very small convection between the Bohai Sea and the Yellow Sea, only circulatory flow in the Bohai Bay, some areas even cannot exchange. These elements objectively determine that the Bohai Sea has a poor self-clean capacity compared with other coastal waters of the country. In such situation, if the ship sailing in Bohai Sea and other waters perform the same discharged standards, the oily water, garbage and other pollutants discharged by ship will make great impacts on the marine environment of the Bohai Sea.

Second, the current ship pollution prevention laws and regulations do not consider the complex navigation environment in Bohai Sea. The meteorological conditions of Bohai Sea are relatively poor. Bohai Sea is one of largest sea areas in China that suffer from strong winds, typhoons, and heavy fog frequently as mentioned in Chapter 1. Meanwhile, with the development of the Circum-Bohai Sea economic zone, shipping industry here has made a spurt of progress, which has made the Bohai Sea one of the maximum concentrations of ship in the word. China Maritime Safety Administration statistics show that from 2001 to 2013, the yearly total number of vessels entering and leaving ports in the Bohai Sea were seen an explosive growth with the number increased from approximate 220,000 to over 705,520, such trend is and will be continuing. Predictably, the Bohai Sea navigation environment will be further complex, and the risk of marine pollution resulting from maritime accidents will also increase.

Third, the existing laws and regulations for the prevention of pollution from ships do not meet the high pollution risk of the Bohai Sea. Dalian port is one of four national crude oil storage bases in China which was constructed at the first batch. With the development of the society and the increasing demand for energy, the Tianjin port, Caofeidian port, Dongying port and other ports around the Bohai Sea are increasing their throughput of the oil, which make the risk of oil spill pollution sharply increases.

The high risk of contamination in Bohai Sea requires that more stringent measures must be taken. But now, the current laws and regulations have no such requirements.

3.3 The existing marine environmental protection system needs to improve

In accordance with the relevant provisions of China's existing marine environmental protection laws and regulations, the Maritime Administration consists of various government entities including *Ministry of Environmental Protection of the People's Republic of China, State Oceanic Administration of the People's Republic of China, China MSA, State Fishery Administration of the PRC and the Military environmental protection department*. There are many overlapping areas of responsibility between the various Government entities and lack of co-operation between them in term of marine pollution prevention, which is not conducive to the marine environment prevention.

To solve these problems, a special area law system including a coordinated-integrated management system which meets the requirement of the ship pollution prevention of Bohai Sea must be established.

3.4 Analysis of the law measures for marine pollution prevention of Bohai Sea caused by vessels

In order to combat pollution from ships in Bohai Sea, China MSA has taken two special measures, one is developing a departmental rule, *Regulations on lead-sealing Procedure for Pollution Prevention Equipments of Ships Operated within the Bohai Sea*, the other is establishing a *Emergency response and coordination mechanism to marine pollution from ships in Bohai Sea*. These measures have reduced the total amount of the pollutants from ships to some extent, but their drawbacks determine that both of them can not fundamentally solve the problem.

Regulations on lead-sealing Procedure for Pollution Prevention Equipments of Ships Operated within the Bohai Sea requires that all ships to which the regulations apply should be forbidden to discharge any oily water into the Bohai sea. It just applies to

the ships operating or staying within the Bohai Sea for one month or more, while such ships account for a very small proportion of the total number of ships sailing in the Bohai Sea. The object of the *Emergency response and coordination mechanism to marine pollution from ships in Bohai Sea* is to respond to major pollution incidents while most of the pollutants discharged by ship are from the operation. So their effect is limited. Due to the fact that ships sailing in the Bohai Sea consist of Chinese flag ships and foreign-flag ships, the laws or regulations related to ship pollution prevention of the Bohai Sea shall not only regulate the behavior of the national ships, but also the foreign ships. Recently, there have been three law measures to prevent the marine pollution for special areas in the world: national legislation, SA and PSSA.

The first way is to designate the Bohai Sea as special marine reserves, develop targeted domestic laws or regulations to prevent marine pollution in the Bohai Sea caused by ships with specific protection measures. The second is to designate the Bohai Sea as a SA through the International Maritime Organization (IMO), and require all ships sailing in the Bohai Sea to meet the strict discharge standards for Special Area under the annexes of the MARPOL convention (IMO, 2015). The third is to designate the Bohai Sea as a PSSAs through the IMO, for PSSAs the coastal country or countries not only can take some special measures such as areas to be avoided, no anchoring areas, traffic separation schemes and so on, but also can give some special requirements, with respect to the ship design, construction, manning and equipment, for all ships sailing in the PSSAs no matter domestic and international to limit the amount of the oily water, garbage, sewage, etc discharged from ships (Zhang, 2000).

3.4.1 The optimization of law measures for marine pollution prevention of Bohai Sea caused by vessels

The advantages of the national legislation are that government can establish special measures with their own wills combined with the actual situation of the Bohai Sea without the violation of international obligations, which will make the legislation more purposeful and feasible and the process of the legislation relatively less complicated. However, there are also many drawbacks. The first is that according to

the requirement of Article 21 of the United Nations Convention on the Law of the Sea (UNCLOS), the coastal state may adopt laws and regulations in respect of the preservation of the environment of the coastal shall not apply to the design, construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules or standards. IMO has been always firmly opposing that the State party takes unilateral measures to force the other State parties' ships to perform in line with the special standards. Therefore, there may be some applicability problems, whether or not the measures taken by national law apply to foreign ships.

A PSSA is an area that needs special protection through action by IMO because of its significance or recognized ecological, socio-economic, or scientific attributes where such attributes may be vulnerable to damage by international shipping activities. The biggest advantage is that it makes the associated protective measures (APMs) in respect to ship design, construction, manning and equipment applicable to foreign ships through IMO. (Du, 2015) By the end of the 2014, there had been 14 PSSAs in the world as is shown in Figure 4 and the related protective measures in Table 4.

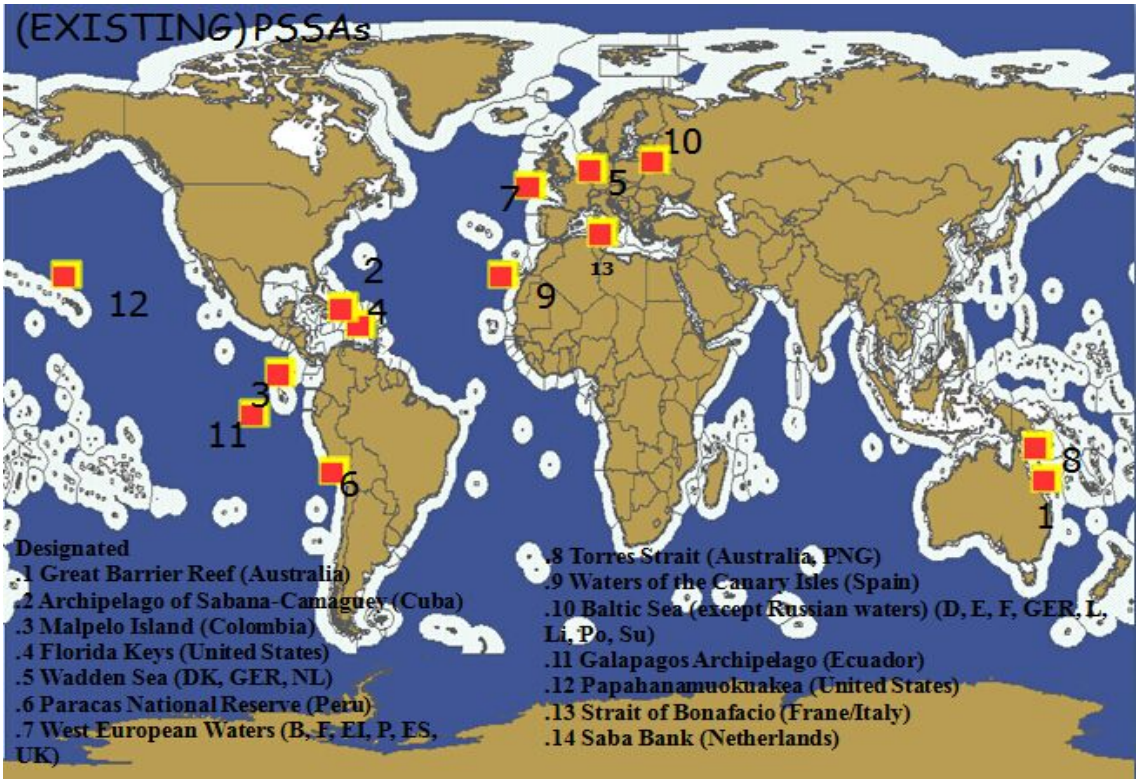

Figure-4 The existing PSSAs in the world
Source: Du, D. C, 2014

Table-4 List of PSSAs and related (APMs)

NO.	**Area**	**Related protective measure**	**The adopted date**
1	Archipelago ofsabana-camaguy	Area To Be Avoided; Prohibitions on any discharge into the sea from any ships; Avoid ballast water discharging and reloading while transiting waters	September 1997, MEPC.74(40)
2	Malpelo Island	Area to be avoided Applies to all fishing vessels, and all other ships in excess of 500 gross tonnage	March 2000, MEPC 47
3	Florida Keys	Four existing Areas to be avoided Three mandatory no anchoring areas	March 2002, MEPC.98(47)
4	Wadden Sea	Compulsory reporting and traffic surveillance **;** Traffic Separation Schemes; Deep-Water Route ; Recommended and compulsory pilotage ; North Sea Special Area -MARPOL Annex I and Annex V	October 2002, MEPC101(48)
5	Paracas National Reserve	Prohibition of navigation of tankers within the sea area of the Paracas National Reserve, apart from those entering and leaving the port; Prohibition of any kind of discharge from ships within the sea area of the Reserve, including discharge of sewage and waste – was rejected	July 2003, MEPC106(49)
6	Waters of the Canary Isles	Area to be avoided; Traffic separation scheme; recommended routes; mandatory ship reporting system	October 2003, MEPC 51/8
7	Baltic Sea (except Russian waters)	Compulsory reporting and traffic surveillance; Mandatory deep sea rout; Compulsory reporting and traffic surveillance; Pilotage services are normally compulsory for ships over certain sizes; Escort and escorting tugs; MARPOL Special Area; Area to be avoided are already under examination.	December 2003 MEPC 51/8/1
8	Galapagos Archipelago	Area to be avoided	December 2003 MEPC 51/8/2
9	Saba Bank	Areas to be avoided no anchoring areas	October 2010, MEPC 62(9)
10	Great Barrier Reef; Torres Strait	Australia’s system of pilotage; Mandatory reporting; Area to be avoided	February 2015, MEPC.68/10/11

Source: Compiled by the author on the basis of basis documents from the https://docs.imo.org/

From Figure 4 and Table 4, we can conclude that most of the existing PSSAs are located along the coast rather than inland and almost all the PSSAs' APM include the measure, Areas to be avoided. This is not applicable to the Bohai Sea, because the density of the ports is very high, approximately in every 60km of coastline exists a port, and over one hundred million people around the Bohai Sea rely on ports and seaborne trade to earn a living. We can also find that the two special cases, Baltic Sea and Wadden Sea are both semi-enclosed sea like Bohai Sea. They were adopted as the Special Area of MARPOL Annex I on 2, Oct 1983 and 1, Feb 1999, and Special Area of MARPOL Annex II on 31, Dec 1988 and 18, Feb 1991 respectively through the IMO, then adopted the PSSA in 2003 and 2002. This situation is the result of interaction between economic development and the environment protection.

Considering the status quo of the Circum-Bohai Sea's economic development and the maritime pollution, the author believes that designation of the Bohai Sea as a SA is an effective and feasible law. On the one hand, from a legislative point of view, the SA legal system is exclusively concerned with an entirely enclosed or semi-enclosed sea. It is applicable to the Bohai Sea, which can reduce the social costs of legislation. On the other hand, the discharge standards in SA can apply to both Chinese vessels and foreign vessels, which can reduce the social costs of implementation. The most important point is that it can drastically reduce the amount of the pollutants discharged into the Bohai Sea by ships through implementation of the strict discharge standards with limited influences for the local economic development. (IMO, 2014)

3.5 Chapter summary

Although accidental pollution will cause serious damaged to the environment, it is usually fairly haphazard. In fact, the majority of pollutants are from the operational pollution. According to the above analysis, we can conclude that the existing ship pollution prevention legal system does not meet the requirement of the pollution prevention from ships in Bohai Sea and the Special Area legal system is the best way for the Bohai Sea under the current situation through the comparison of the three law measures.

Chapter 4 Study on Special Area Legal System

4.1 The concept and origin of the Special Area

The concept of the Special Area and related measures belongs to MARPOL, so we shall firstly know the content and objective of the MARPOL.

4.1.1 A brief introduction of MARPOL 73/78 Convention

On 18 March 1967, Liberian supertanker Torry Canyonshe struck Pollard's Rock on Seven Stones reef between the Cornish mainland and the Isles of Scilly and about 120 thousand-ton crude oil spill on the southwest coast of the United Kingdom, which caused enormous damage to the local marine environment. It was the most serious oil spill at that time. The incident raised questions about measures to prevent oil pollution from ships and also exposed deficiencies in the existing system for providing compensation following accidents at sea. (Xue, 2011)

Table 5- Status of MARPOL as of 30 September 2012

MARPOL Annex	Entry into force	Number of ratifications	Fleet (%)
MARPOL Annexes I	2 October 1983	152	99.20
MARPOL Annexes II	6 April 1987	152	99.20
MARPOL Annexes III	1 July 1992	138	97.59
MARPOL Annexes IV	27 September 2003	131	89.65
MARPOL Annexes V	31 December 1988	144	98.47
MARPOL Annexes VI	19 May 2005	71	94.29

Source: IMO. (2013). MARPOL-How to Do It (2013 edition). London: Author.

IMO made a plan of action on technical and legal aspects of the Torrey Canyon incident. It also organized an international conference in 1973 to prepare a suitable international agreement for placing restraints on the contamination of the sea, land

and air by ships. By adopting some further amendments to International Convention for the Prevention of Pollution of the Sea by Oil 1954 (OILPOL) and incorporating some measures on tanker design and operation relating to the 1974 Convention on the Safety of Life at Sea, 1974, finally the Protocol of 1978 is referred to as the MARPOL 73/78. MARPOL 73/78 entered into force on 2, October 1983 (Annexes I and II). It is the most important international convention for prevention of pollution of marine environment by ships from accidental or operational causes. (Li, 2014) It includes six technical Annexes currently, and the status of MARPOL as of 30 September 2012 is in table 5.

4.1.2 The concept of the Special Area

In order to protect certain enclosed or semi-enclosed sea area with important oceanographical and ecological value, MARPOL73/78 Convention made a very important new concept, Special Area.

> A Special Area is defined as "a sea area where for recognized technical reasons related to its oceanographical and ecological conditions and to the particular character of its traffic, the adoption of special mandatory methods for the prevention of sea pollution by oil, noxious liquid substances, sewage, or garbage, as applicable, is required ". MARPOL (2006)

The measures taken in the SA are to provide more strict discharge standards than other areas of the sea for ship entering or leaving the SA. The discharge standards in SA are set in the five Annexes of the MARPOL: Annex I-Regulations for the Prevention of Pollution by Oil, Annex II-Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk, Annex IV-Prevention of Pollution by Sewage from Ship, Annex V-Prevention of Pollution by Garbage from Ships and Annex VI-Prevention of Air Pollution from Ships.

4.1.3 The origin of the Special Area

The concept of Special Area can be traced back to the delimitation of the prohibited discharge area. In 1954, the OILPOL stipulated that oil and oily water should be prohibited to discharge into the sea less than 50 nautical miles from the land and within the particular area including the North Sea, the Baltic Sea and the Mediterranean Sea. Subsequently, the area of the prohibited discharge area were expanded when the OILPOL were modified in 1962. OILPOL is a special convention for international community to reduce the ship operational pollution in particular oil pollution, it is one of the notable landmarks in the history of international marine environmental protection. The drawback is that it only concerns the regulations related to oil pollution, not other substances which are harmful to the marine environment discharged by ships.

In 1973, in order to prevent marine pollution from ships, IMO developed the MARPOL 73 Convention, firstly proposed the concept of Special Areas and stipulated that ships sailing in the Special Area should implement more strict discharge standards under the Annexes of the MARPOL Convention.

In 1982, In order to provide special protection for the areas which have important oceanographical and ecological value and the particular character of its traffic over the world, Article 211 of the UNCLOS stipulates that the coastal states can adopt special mandatory measures in its Special Area for the prevention of pollution from vessels after the competent international organization determined that the conditions in that area correspond to the requirement. When submitting the application of establishment of Special Area, the states should provide technical and scientific evidence in support and information on necessary reception facilities.

In 1991, IMO adopted the Guidelines for the Designation of Special Areas under MARPOL. Until then, the Special Area legal system was not basically formed.

4.2 Discharge requirements within SAs

The measures to prevent ship pollution from operational discharge within SAs is the

implementation of more strict discharge standards in SAs that in general area. The specific discharge requirements are laid down in the annexes of the MARPOL. At present, all the six Annexes have entered into force, and all of them have the discharge standard within SAs except Annex III. (Tang & Cai, 2007)

4.2.1 Annex I-Regulations for the Prevention of Pollution by Oil

Annex I applies to all ships to which MARPOL applies. Annex I gives the specific standards for cargo space operational discharges of oil tankers in Table 6 and machinery space operational discharges of all ships in Table 7

Table 6-Control of machinery space operational discharges – All Ships

Sea Area	**Ship type and size**	**Discharge criteria**
Anywhere **outside a Special Area**	All ships of 400 GT and above	**No discharge** except when: 1.The ship is *en route* 2.The oil content of the effluent is 15 ppm or less 3.The ship has in operation an oil filtering equipment 4.On oil tankers, oily mixture does not originate from cargo pump room bilges or is not mixed with oil cargo residue
Anywhere except the Antarctic	Ships of less than 400GT	**No discharge -** retain on board (to be discharged to port reception facilities); or discharge through 15 ppm equipment
Anywhere **within a Special Area**	All ships of 400 GT and above	**Same as outside a Special Area;** however, the oil filtering equipment should have 15 ppm alarm and 15 ppm automatic stopping device
Antarctic	All ships	**No discharge**
Special Area : Mediterranean, Baltic Sea, Black Sea, Red Sea, 'Gulfs area', Gulf of Aden, Antarctic, NW European waters, Oman area of the Arabian Sea, and Southern South Africa waters		

Source: Du, D. C. (2015).

From Table 6 we can conclude that any oil and oil mixtures are forbidden to be discharged into the Antarctic and with respect to the discharge of oil and oily mixtures from the machinery space of any oil tanker within SAs, the discharge standard is the same as outside a SA, however, the oil filtering equipment should have 15ppm alarm and 15ppm automatic stopping device. These devices can significantly reduce the excessive discharge of pollutants resulting from operational errors or equipment failure within SAs.

Table 7- Control of cargo space operational discharges -- Oil Tankers

Sea area	Discharge Criteria
Within 50 n miles from land	**No discharge** except for clean or segregated ballast (as for Special Areas)
Outside Special Areas	**No discharge** except for either: Clean or segregated ballast or when: ■ Tanker is *en route* ■ Rate does not exceed 30L per n. mile ■ Quantity does not exceed 1/30,000 of total quantity of cargo carried ■ The tanker has in operation a slop tank arrangement and an oil discharge monitoring and control system
Within a Special Area	**No discharge** except clean or segregated ballast
Special Area : Mediterranean, Baltic Sea, Black Sea, Red Sea, 'Gulfs area', Gulf of Aden, Antarctic, NW European waters, Oman area of the Arabian Sea, and Southern South Africa waters	

Source: Du, D. C. (2015).

From Table 7 we can clearly find that with respect to the discharge of oil and oily mixtures from the cargo area of any oil tanker within SAs it should be noted that there is a general prohibition of any of such discharges.

4.2.2 Annex II-Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk

Only one Special Area under Annex II: Antarctic Area – No discharge of any NLS residue.

4.2.3 Annex IV-Prevention of Pollution by Sewage from Ship

Targeting passenger ships, the regulation requires that the discharge of sewage from passenger ships within SAs shall be generally prohibited for new ships on or after 1 January 2016 and for existing passenger ships on or after 1January 2018. Or the ships have a sewage treatment plant approved by the Administration and keep it in operation within SAs.

4.2.4 Annex V-Prevention of Pollution by Garbage from Ships

Annex V applies to all ships, including yachts, fishing vessels and offshore platforms. One of the most important requirements in Annex V is to prohibit the discharge of all plastics everywhere. The prohibitions and restrictions are shown in Table 8.

Table 8-Summary of restrictions to the discharge of garbage into the sea

Garbage categories	**Discharge outside Special Areas**	**Discharge within Special Areas**
Food waste comminuted or ground	more than 3 n-miles from land, and *en route*	more than 12 n-miles from land, and *en route*
Food waste not comminuted or ground	more than 12 n-miles from land, and *en route*	**Prohibited**
Cargo residues	more than 12 n-miles from land, and *en route*	**Prohibited;** if it is cargo residue washing water and no port reception facilities, more than 12 n-miles from land, and *en route*
Animal carcasses	as far as possible from land, and *en route*	**Prohibited**
8 Special Areas: Mediterranean Sea, Baltic Sea, Black Sea, Red Sea, 'Gulfs' area, North Sea, Antarctic area, Wider Caribbean		

Source: International Convention for the Prevention of Pollution from Ship. (2006).

We can clearly see that compared with the general seas, almost all the garbages including food waste not comminuted and ground, cargo residue and animal carcasses are prohibited to discharge within SAs except food waste not comminuted and ground.

4.2.5 Annex VI-Prevention of Air Pollution from Ships.

Annex VI 6 is mainly through the establishment of emission control areas (ECAs) to prevent air pollution from ships within SAs. Regulation 13 of Annex VI gives the standards for emissions of NOx by marine diesel engine in Table 9, and regulation 15 gives the limits on sulphur content of any fuel used on board ships shown in Figure 5.

Regulation 13 applies to marine diesel engines with power output more than 130kw installed on ship constructed on or after 1 January 2000, or which undergo a major conversion on or after 1 January 2000, while it is not applicable to emergency diesel engines, engines installed in lifeboats and any device or equipment intend to be used solely in case of emergency. Regulation 14 applies to all fuel oil used on board.

Table 9-NOx emission limits

Tier	Ship construction date(on or after)	total weighted cycle emission limit (g/kWh) n=engine's rated speed (rpm)-crankshaft rpm		
		n<130 rpm	130≤n<200rpm	n≥2000rpm
I	1 January 2000	17.0g/kWh	$45.0*n^{(-0.2)}$ g/kWh	9.8 g/kWh
II	1 January 2011	14.4 g/kWh	$44.0* n^{(-0.2)}$ g/kWh	7.7 g/kWh
III*	1 January 2016	3.4 g/kWh	$9.0* n^{(-0.2)}$ g/kWh	2.0 g/kWh
*ships operating within designated ECAs				

Source: IMO. (2013). MARPOL-How to Do It (2013 edition). London: Author.

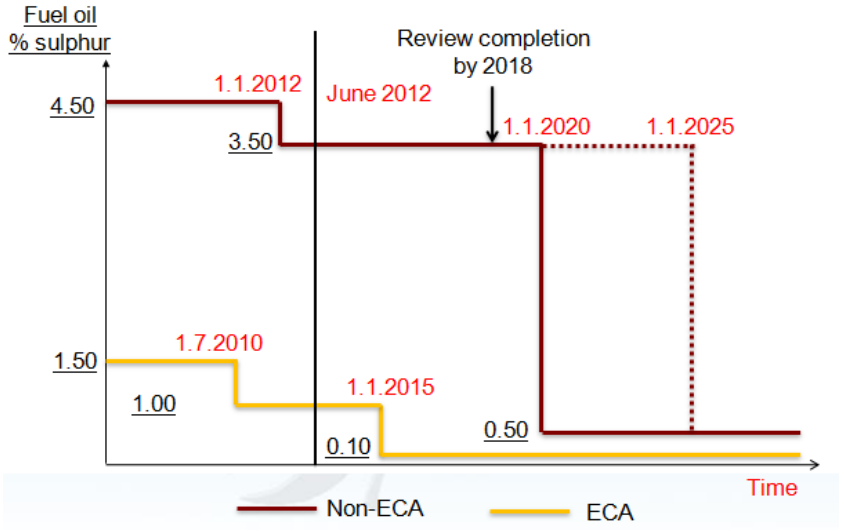

Figure 5-Sulphur oxides and particulate matter (SOx & PM)

Source: Du, D. C. (2015).

From Table 9 and Figure 5 we can conclude that the standards of emission are very high no mater NOx or SOx and PM within ECAs. This approach would greatly reduce the emission of air pollution from ships within ECAs, while it is a greater challenge for ship owners and the local economic development.

4.3 Existing SAs

Since the adoption of the SA, many areas around the world are designated as SAs under different of the Annexes to MARPOL. By the end of 2013 there are 10 SAs under Annex I, 1 under Annex II, 1 under Annex IV, 8 under V and 4 under Annex VI, the status of SAs are showing in the Table 10.

Table-10 The status of SAs

Special Area	Adopted	Date of Entry into Force
Annex I: Oil (10)		
Mediterranean Sea area	2 November 1973	2 October 1983
Baltic Sea area	2 November 1973	2 October 1983
Black Sea area	2 November 1973	2 October 1983
Red Sea area	2 November 1973	2 October 1983
Gulfs area	2 November 1973	2 October 1983

Gulf of Aden area	1 December 1987	1 April 1989
Antarctic area	16 November 1990	17 March 1992
North West European waters	25 September 1997	1 February 1999
Oman area of the Arabian Sea	15 October 2004	1 January 2007
Southern South African waters	13 October 2006	1 March 2008
Annex II: Noxious Liquid Substances		
Antarctic area	30 October 1992	1 July 1994
Annex IV:		
Baltic Sea area		1 January 2013
Annex V: Garbage (8)		
Mediterranean Sea area	2 November 1973	31 December 1988
Baltic Sea area	2 November 1973	31 December 1988
Black Sea area	2 November 1973	31 December 1988
Red Sea area	2 November 1973	31 December 1988
Gulfs area	2 November 1973	31 December 1988
North Sea area	17 October 1989	18 February 1991
Antarctic area	16 November 1990	17 March 1992
Wider Caribbean Region	4 July 1991	4 April 1993
Annex VI: Prevention of air pollution by ships (4)		
Baltic Sea area (SOx ECA)	26 September 1997	19 May 2005
North Sea area (SOx ECA)	22 July 2005	22 November 2006
North American ECA (SOx, NOx, and PM)	26 March 2010	1 August 2011
United States Caribbean Sea (SOx, NOx, and PM)	15 July 2011	1 January 2014

Source: Compiled by the author on the basis of basis documents from the https://docs.imo.org/

4.4 Chapter summary- The significance of designation of Bohai Sea as a SA

4.4.1 Reduce pollution of the Bohai Sea from ships

The oily water, NLS, garbage, etc discharged from ships is an important factor causing environmental pollution in the Bohai Sea. With the increasing capacity of ports in the Bohai Sea, the number of ships entering or leaving the Bohai Sea

continues to increase, and the amount of pollutant emissions from ships will be more and more. The conflict between the limited self-clean capacity of the Bohai Sea and the increase amount of the pollutant discharged from ships will be serious, and the marine environment of the Bohai Sea will get worse. Taking effective measures to control the ship pollutant emissions to the Bohai Sea has become the objective requirements of the Bohai Sea environmental protection work.

According to the MARPOL73/78 Convention, SAs designated under the annexes are provided with a higher level protection than other areas of the sea, in other words, the discharge standards taken in the SAs are stricter than these outside the SAs just as we discussed in 4.2. So the designation of the Bohai Sea as a SA can drastically decrease the amount of the pollutant from ships especially the oil, oily water and the garbage.

4.4.2 Get more attention for the environment of the Bohai Sea

The environmental problems of the Bohai Sea have attracted close attention from the maritime and environmental communities, domestic and international. For example, both the Partnerships in Environmental Management for the Sea of East Asia-Bohai Sea Environmental Management Plan sponsored by Global Environment Center Foundation, and the Coastal Resource Conservation and Environmental Management of the Bohai Sea sponsored by Asian Development Bank provide a certain amount of technical and financial support for the governance of the marine environment of the Bohai sea and these programmes have played a positive role.

The designation of the Bohai Sea as a SA will bring more attention to this area and get more technical and financial support to ensure the resource of the Bohai Sea are effectively and rationally utilized.

4.4.3 Improve the existing Bohai Ship pollution prevention legal system

Although China has formed a relatively complete Bohai Ship pollution prevention legal system, there are two big problems.

One is that the discharge standards in Bohai Sea are the same as the other waters of the country without considering the special geographic, economic and social characteristics of the Bohai Sea. The other is that the application of the only special rule of the Bohai Sea, *Regulations on lead-sealing Procedure for Pollution Prevention Equipments of Ships Operated within the Bohai Sea*, is very narrow. It just applies to the ships operating or staying within the Bohai Sea for one month or more.

The designation of the Bohai Sea as a SA effectively highlight the special characteristics of the Bohai Sea as a semi-enclosed seas, thereby further improving the existing Bohai Ship pollution prevention legal system (Shen, 2011).

Chapter 5 Proposal for the Designation of Bohai Sea as a SA

To designate the Bohai Sea as a SA involves a great deal of work. Not only should the state understand the criteria and procedures for the designation of a Special Area, analyze that could the situation of the Bohai Sea meet such criteria in the other world, feasibility analysis, but also establish appropriate complementary law or regulations, such as penalty clauses, guideline for reception facilities in each port within SA, etc to ensure the effective implementation of special area legal system.

5.1 Criteria for the designation of a Special Area

An area to be given Special Area status must satisfy the following three categories: oceanographic conditions which may cause the concentration or retention of harmful substances in the waters or sediments of the area, ecological conditions indicating that protection of the area from harmful substances is needed to preserve and vessel traffic characteristics. In addition, the additional information may also be considered. (IMO, 2014)

5.1.1 Oceanographic conditions

Oceanographic conditions for a SA include particular circulation patterns (e.g. convergence zones and gyres) or temperature and salinity stratification, extreme ice state, long residence time caused by low flushing rates and adverse wind conditions. (IMO, 2014)

5.1.2 Ecological conditions

A SA’s ecological conditions includes depleted, threatened or endangered marine species, spawning, breeding and nursery areas for important marine species and areas representing migratory routes for seabirds and marine mammals, rare or fragile

ecosystems such as coral reefs, mangroves, seagrass beds and wetlands, areas of high natural productivity (such as fronts, upwelling areas, gyres) and critical habitats for marine resources including fish stocks and/or areas of critical importance for the support of large marine ecosystems. (IMO, 2014)

5.1.3 Vessel traffic characteristics

Vessel traffic characteristics of a SA is that the sea area are used by ships to an extent that the discharge of harmful substances by ships when operating in accordance with the requirements of MARPOL for areas other than Special Areas would be unacceptable in the light of the existing oceanographic and ecological conditions in the area. (IMO, 2014)

5.1.4 Other considerations

.1 If the reception facilities in the SA are not satisfied for the ships operating in accordance with the MARPOL requirements for general areas other than Special Areas, the argument for designating an area as a Special Area may be strengthened. (IMO, 2014)

.2 If measures are being, or will be, taken to prevent, reduce and control pollution of the marine environment from other sources such as land-based sources, dredged materials, dumping of wastes and as well as atmospheric deposition, proposals for designation of a Special Area would be strengthened. (IMO, 2014)

.3 If measures are being taken to manage the area's resource, the proposals would be strengthened. (IMO, 2014)

Generally, both information on each category and the additional information should be provided in a proposal for designation. Only when adequate reception facilities are provided for ships in accordance with the provisions of MARPOL 73/78 Convention,

can the requirements of a Special Area designation become effective. (IMO, 2014)

5.2 **Procedures for the designation of a SA**

A proposal to designate a given sea area as a Special Area should be submitted to the Marine Environment Protection Committee (MEPC) for its consideration, in accordance with the guidelines approved by the Committee for submission of documents. A proposal to designate a sea area as a Special Area should contain a draft amendment to MARPOL as the formal basis for the designation and a background document setting forth all the relevant information to explain the need for the designation. (IMO, 2014)

> *The background document should contain the following information: 1) a definition of the area proposed for designation, including its precise geographical coordinates and a reference chart; 2) an indication of the type of Special Area proposed. Proposals for each Annex should be presented and evaluated separately; 3) a general description of the area, including information regarding: oceanography; ecological characteristics; social and economic value; scientific and cultural significance; environmental pressures from ship-generated pollution; other environmental pressures; and measures already taken to protect the area. This general description may be supported by annexes containing more detailed material, or by references to readily available documentation; 4) an analysis of how the sea area in question fulfils the criteria for the designation of Special Areas and 5) information on the availability of adequate reception facilities in the proposed Special Area.* (IMO, 2014)

After submission of the proposal including all materials required by the relevant guideline, the next is the most important procedure-amendment procedure which determines whether or not the proposal is adopted, in other words, only after the amendment to the MARPOL enters into force, the proposal for designation of a given sea area as a Special Area will be adopted .The formal amendment procedure

applicable to proposals for the designation of Special Areas is set out in article 16 of MARPOL (see Appendix 1). (IMO, 2014)

5.3 The feasibility of designation of the Bohai Sea as a SA

5.3.1 Oceanographic conditions of the Bohai Sea

.1 particular circulation patterns and long residence time caused by low flushing rates

Bohai Sea is the only semi-enclosed sea in China. As inland water, it is embraced on three sides by lands and only the east connects to the Yellow Sea, since the characteristics of the semi-enclosed and Miaoqun islands lined along the mouth of the Bohai Bay, there is very small convection between the Bohai Sea and the Yellow Sea, only circulatory flow in the Bohai Bay, which objectively determine that the Bohai Sea has a poor self-clean capacity. (Sun, 2006) The State Oceanic Administration of China' relevant data show that it will take at least 16 years for the Bohai Sea to complete a water exchange.

.2 temperature and salinity stratification

The hydrological features of the Bohai Sea are severe influenced by the continental climate and the flow of the fresh water. In winter, the surface water temperature is -1~2 degrees Celsius, decreasing from center to the edges. In summer, the coastal surface waters can reach 26~27 degrees Celsius, while the central is 24~26 degrees Celsius. (Zhao, Tian, Chu, & Li, 2005)

.3 adverse wind conditions

The weather conditions of the Bohai Sea are very complicated, and difficult to be accurately forecasted, especially in winter, the heavy northerly winds accompanied the waves come frequently, which causes plenty of marine casualties. For example, November 24, 1999, the RO-RO ship "Dashun" sailing from Yantai to Dalian capsized near Yantai water mainly due to the adverse wind conditions, causing 282

deaths, with only 22 survivors. (Wang, 2004)

5.3.2Ecological conditions of the Bohai Sea

.1 depleted, threatened or endangered marine species

There are many endangered marine species living in or around the Bohai Sea such as mammal including Finless porpoise and Harbor seal, birds including Phoebastria albatrus, Haliaeetus leucoryphus, Phalacrocorax capillatus, and spoonbill and reptiles-Agkistrodon shedaoensis. All the species mentioned above are included in China Red Book of Endangered Animals. (Le & Chen, 1998) Additionally, the Bohai Sea and coastal areas are important bases for wild marine species conservation in China. There are many famous national nature reserve, for example, Laotieshan Reserve, Dalian harbor seal Reserve, the Yellow River Delta Wetlands Nature Reserve, etc. (Li, Niu & Dai, 2008)

.2 areas of high natural productivity

The coastal waters and estuary regions in the Bohai Sea are the important seawater-fresh water ecotone. The continuations complement of the biogenic elements by the surface runoff, for instance, the Yellow River make the bays such as Laizhou Bay, Liaodong Bay and their adjacent waters become highly productive areas and the important spawning, breeding and nursery areas for marine economic important species such as Spanish mackerel, Penaeus orientalis, Amphioxus. (Li , Niu & Dai, 2008)

.3 importance for the support of large marine ecosystems.

According to the related statistics, there are more than 700 species of marine organism in the Bohai Sea which constitutes an extremely complex and diverse marine ecosystem including over 289 types of fish, 120 species of phytoplankton, 100 kinds of zooplankton, 100 types of phytobenthos and104 species of zoobenthos. (Li , Niu & Dai, 2008)

.4 areas representing migratory routes for seabirds

Due to the special geographical location, at the junction of Frigid Zone and Torrid Zone, the Bohai Sea becomes an essential migratory area for waders. (Yang, 2012)

5.3.3Vessel traffic characteristics

The Bohai Sea is one of the most intensively trafficked sea areas in the world and both the number and the size of ships have increased during the recent years. From Table 2, we can clearly find that from 2011 to 2014, each year there are approximately 705.2 thousand ships entering or leaving the Bohai Se and about 47.7 thousand were on international voyage. In addition, meteorological condition is relatively poor, the ships sailing in the Bohai Sea usually surf Storm surge and cold wind in winter. Every year the big amount of oil, oily water, garbage, sewage, NLS, etc discharged or spilled into the Bohai Sea by approximately 480,000 ships significantly contributes to the marine environment pollution. (China MSA database)

5.3.4 Other consideration

As early as 2009, China MSA began to guide and supervise the construction of reception facilities in ports along the coast of the country, so we can declare that there are adequate reception facilities available for pollutants from ship under MARPOL in relevant ports within the Bohai Sea. Regulations on Emergency Preparedness and Response for marine pollution from ship of the PRC (2011)

Article 15 of the *Regulations Concerning the Prevention of Pollution of Sea Areas by Vessels of the PRC,* which entered into the force on 9 September, 2009, stipulates that the sewage, garbage, oily mixtures, NLS mixtures, exhaust gas and ballast water discharged by ships shall comply with the standards required by the relevant laws, regulations and the conventions to which China accessed. And article 60 stipulates that every ship violating the above provision will be impose a fine of 20,000 to 100,000 RMB.

Chinese government has implemented the Bohai Sea Blue Sea Action Plan aimed to control the pollution from land-base since 2001 and the Regulations on lead-sealing Procedure for Pollution Prevention Equipments of Ships Operated within the Bohai Sea since 2003 to control the pollution of the Bohai Sea.

5.4 Chapter summary

The author firstly introduces the criteria and procedures for the designation of a Special Area, then analyzes the condition of the Bohai Sea with respect to its oceanographic conditions, ecological conditions, vessel traffic characteristics and some other additional information in accordance with the criteria for the designation of a Special Area, and finally arrives at a conclusion that the actual situation of the Bohai Sea is in line with such criteria.

Chapter 6 Conclusion

The severe pollution situation of the Bohai Sea has seriously restricted the economic development of the Circum-Bohai Sea Region, and has attracted the public attention. It is time to take actions as soon as possible. The oil, oily water, garbage, sewage, etc discharged or spilled by ships sailing in the Bohai Sea is an important factor leading to the deterioration of the marine environment of the Bohai Sea. The existing ship pollution prevention legal system does not meet the requirement of the pollution prevention from ships in Bohai Sea, because so far China's current laws related to the ship pollution prevention have been established for all waters of the country without considering the characteristics of the Bohai Sea as a semi-enclosed sea. It is urgent and significant to take effective measures to prevent ship pollution in Bohai Sea immediately.

Firstly, the article analyzes polluted condition of the Bohai Sea, and also analyzes the important effect on Chinese society and economy because of the serious pollution of the Bohai Sea. Then, we discuss the reasons why our laws and regulations to prevent pollution from ships do not meet the request of environmental protection of the Bohai Sea from the legal stratification and propose three kinds of legal method: National Legislation, SA legal system and PSSA legal system. After the analysis of the advantages and disadvantages of the three measures and full consideration of the status quo of the China's economic development, the authors propose that the SA legal system is the best way to balance the conflicts between the economic development and the environment prevention requirements of the Bohai Sea. Finally, we discuss the feasibility of designation of the Bohai Sea as a SA and propose some supplementary measures.

.1 Considering the main pollution source of the Bohai Sea from ships and the procedures of the designation of the Bohai Sea as a SA, the author suggests that we should first make a proposal for the designation of Bohai Sea as a SA under the Annexes I and V to the MARPOL.

.2 Although the feasibility of designation of the Bohai Sea as a SA has been demonstrated, the proposal for the designation of Bohai Sea as a SA is a very complex work. We must conduct in-depth investigations and make detailed support evidence to make sure it is adopted by the IMO. Here the author recommends that relevant authorities should carry out the work as quickly as possible, and submit the integrative proposal to the IMO in a timely manner (Li, 2003).

3. The government should adjust the industrial structure of the Circum-Bohai Sea Region, concentrate the ports in the Bohai Sea and keep them as much as possible away from sensitive waters to prepare for the delimiting Area to be avoided.

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APPENDIX

Article 16 ***Amendments***

(1) The present Convention may be amended by any of the procedures specified in the following paragraphs.

(2) Amendments after consideration by the Organization:

(a) any amendment proposed by a Party to the Convention shall be submitted to the Organization and circulated by its Secretary-General to all Members of the Organization and all Parties at least six months prior to its consideration;

(b) any amendment proposed and circulated as above shall be submitted to an appropriate body by the Organization for consideration;

(c) Parties to the Convention, whether or not Members of the Organization, shall be entitled to participate in the proceedings of the appropriate body;

(d) amendments shall be adopted by a two-thirds majority of only the Parties to the Convention present and voting;

(e) if adopted in accordance with subparagraph (d) above, amendments shall be communicated by the Secretary-General of the Organization to all the Parties to the Convention for acceptance;

(f) an amendment shall be deemed to have been accepted in the following circumstances:

(i) an amendment to an article of the Convention shall be deemed to have been accepted on the date on which it is accepted by two thirds of the Parties, the combined merchant fleets of which constitute not less than 50 per cent of the gross tonnage of the world's merchant fleet;

(ii) an amendment to an Annex to the Convention shall be deemed to have been accepted in accordance with the procedure specified in subparagraph (f)(iii) unless the appropriate body, at the time of its adoption, determines that the amendment shall be deemed to have been accepted on the date on which it is accepted by two thirds of the Parties, the combined merchant fleets of which constitute not less than 50 per

cent of the gross tonnage of the world's merchant fleet. Nevertheless, at any time before the entry into force of an amendment to an Annex to the Convention, a Party may notify the Secretary-General of the Organization that its express approval will be necessary before the amendment enters into force for it. The latter shall bring such notification and the date of its receipt to the notice of Parties;

(iii) an amendment to an appendix to an Annex to the Convention shall be deemed to have been accepted at the end of a period to be determined by the appropriate body at the time of its adoption, which period shall be not less than ten months, unless within that period an objection is communicated to the Organization by not less than one third of the Parties or by the Parties the combined merchant fleets of which constitute not less than 50 per cent of the gross tonnage of the world's merchant fleet whichever condition in fulfilled;

(iv) an amendment to Protocol I to the Convention shall be subject to the same procedures as for the amendments to the Annexes to the Convention, as provided for in subparagraphs (f)(ii) or (f)(iii) above;

(v) an amendment to Protocol II to the Convention shall be subject to the same procedures as for the amendments to an article of the Convention, as provided for in subparagraph (f)(i) above;

(g) the amendment shall enter into force under the following conditions:

(i) in the case of an amendment to an article of the Convention, to Protocol II, or to Protocol I or to an Annex to the Convention not under the procedure specified in subparagraph (f)(iii), the amendment accepted in conformity with the foregoing provisions shall enter into force six months after the date of its acceptance with respect to the Parties which have declared that they have accepted it;

(ii) in the case of an amendment to Protocol I, to an appendix to an Annex or to an Annex to the Convention under the procedure specified in subparagraph (f)(iii), the amendment deemed to have been accepted in accordance with the foregoing conditions shall enter into force six

months after its acceptance for all the Parties with the exception of those which, before that date, have made a declaration that they do not accept it or a declaration under subparagraph (f)(ii), that their express approval is necessary.

(3) Amendment by a Conference:

(a) Upon the request of a Party, concurred in by at least one third of the Parties, the Organization shall convene a Conference of Parties to the Convention to consider amendments to the present Convention.

(b) Every amendment adopted by such a Conference by a two-thirds majority of those present and voting of the Parties shall be communicated by the Secretary-General of the Organization to all Contracting Parties for their acceptance.

(c) Unless the Conference decides otherwise, the amendment shall be deemed to have been accepted and to have entered into force in accordance with the procedures specified for that purpose in paragraph (2)(f) and (g) above.

(4) (a) In the case of an amendment to an Optional Annex, a reference in the present article to a “Party to the Convention” shall be deemed to mean a reference to a Party bound by that Annex.

(b) Any Party which has declined to accept an amendment to an Annex shall be treated as a non-Party only for the purpose of application of that amendment.

(5) The adoption and entry into force of a new Annex shall be subject to the same procedures as for the adoption and entry into force of an amendment to an article of the Convention.

(6) Unless expressly provided otherwise, any amendment to the present Convention made under this article, which relates to the structure of a ship, shall apply only to ships for which the building contract is placed, or in the absence of a building contract, the keel of which is laid, on or after the date on which the amendment comes into force.