

A Study on Certification of Officers in charge of a Navigational Watch on Tug-barges

Sung-Hyeon Park[†] · Sang-Do Lee*

[†] Division of Maritime Transportation System, Mokpo National Maritime University, Mokpo, 530-729, Korea

* Graduate school of Mokpo National Maritime University, Mokpo, 530-729, Korea

Abstract : Marine accidents related to the tug-barges are frequent recently, such as oil spill caused by collision between oil tankers and tug-barges. There are many causes of these accidents, but poor working condition of operators takes up a considerable part of most causes. That is, the danger of accidents caused by fatigue accumulation exists in tug-barges of less than 200 gross tonnage engaged on near-coastal voyages or short shipping, because of the long-distance navigational watch by only one master. This paper aims to deduce problems of human element part out of the plan of safe navigation, and to propose legal amendments for preventing marine accidents by tug-barges.

Key words : Tug-barges, Problems, Improvements, Certification of officers in charge of a navigational watch

1. Introduction

A Hong Kong-registered giant tanker Hebei Sprit leaked an estimated 10,500 tons of crude oil into the waters on the morning of 7 December 2007 after it collided with a barge carrying a crane. While the barge was anchored by another vessel, a tow wire was cut due to the strong winds and high waves. Recently, such marine accidents related to combined tug-barges are increasing every year. (Lee, 2008).

A analysis of frequency of collision in national flag vessel(except fishing boat) shows that the rate of collision accident for tug-barge is 40% higher than other general vessels. (Maritime-Fisheries Affairs Ministry, 2003). Especially, operation of tug-barges are increasing every day in coastal waters in lately, such as sand-picking in sea, harbor construction, and sea transportation of big plant structures. In case of Ulsan port, the number of tug-barge that crosses the port and loads blocks of vessel is 2500 ships until the end of last May this year. It is rapidly increased of 57% from a year ago. Ulsan Regional Maritime Affairs and Port Office premised that the number of tug-barges would be increased more and more.

Marine accidents of these tug-barges are increasing continuously because they are restricted in their maneuverable ability and operated unreasonably as compared to general vessels. Especially, our nation's south and west coast has a lot of islands, narrow channels, frequent mists that lead to limitation of visibility. Therefore, the tug-barges plying in these sea areas are always face upto a lot of

danger for the safe navigation. In addition, the probability of occurrence of the tug-barges' accident is high because it is difficult to evacuate quickly and to operates unreasonably under the bad weather. Due to restricted maneuverability of its towing line of the stern, tug-barges involve a lot of potential risk when the ship operates in narrow channels that tidal current is strong or in the large angle steering areas.

There are two kinds of barges connected with a tugboat. One is a manned barge equipped with accommodation, sanitation, life saving appliances, fire protection, and so on. And the other is an unmanned barge not equipped with these appliances and facilities. As a barge administrator boarded in the unmanned barge unequipped with these facilities, he may be very dangerous during the vessel operation in the barge.

Without professional training of tug-barge operation has been achieved systematically, most educations are done orally by master on the spot. It is necessary to establish a systematic improvements, grasping the problems and situation of combined tug-barges.

In the United States, for the safety of tug-barges, it is being specified carrying on duty by two persons, working by 12 hours per person and requirements of qualification based on the STCW. Once a crew violate the rules, it is requested to notify to the United States Coast Guard immediately.

In our country, however, in the tug-barges of less than 200 gross tonnage engaged on near-coastal voyages, the danger of accidents caused by fatigue accumulation is ever-present because only one master carries on duty of the

[†] Corresponding Author : Sung-Hyeon Park, shpark@mmu.ac.kr, 061)240-7171

* oksangdo@naver.com 061)867-5783

long-distance despite restricted maneuverability due to stern towing. That is, although tug-barge takes 40 to 50 hours to navigate between Busan and Incheon by 5 knots, only one master is taking full charge of operation.

The aim of this study is to present improvement plans and to deduce problems of human element part about operation of tug-barges. This paper proposes the introduction of certificate of officers in charge of a navigational watch as improvements for solving problems, such as taking full charge of duties for long hours by only one master, and being on watch by unqualified chief engineer in navigational watch, and lacking of crew in the barges.

2. Analysis of marine accidents by tug-barges

This paper analyzed marine accidents by tugboats for the last 5 years. Table 1 shows the number of marine accidents except fishing vessel from 2003 to 2007. The table indicated that accidents of tugboat decreased in 2004 to 2005, but increased again right after. Especially, contrary to most vessels' diminishment in 2006 to 2007, accidents of tugboats are increased. Due to high incidents of tugboats, VTS center of Busan Regional Maritime Affairs and Port Office urges forcefully tug-barges' master to listen VHF. The Party is puzzling its mind about the accident prevention.

Table 1 Marine accidents (except fishing vessel) according to vessel type

(Unit : Number of vessel)

	Passenger	Cargo ship	Oil tanker	Tug-boat	Others
2003	10	120	28	51	75
2004	20	130	24	67	95
2005	8	99	24	37	59
2006	17	110	43	53	58
2007	13	96	31	55	69
Total	68	555	150	263	356

Table 2 Marine accidents' causes of tugboats (2003-2007)

(Unit : Number of vessel)

	collision	grounding	fire	engine damage	sinking	others	Total
2003	23	7	2	0	10	9	51
2004	26	8	3	1	12	17	67
2005	15	3	4	1	7	7	37
2006	26	5	2	2	4	14	53
2007	29	7	0	1	3	15	55
Total	119	30	11	5	36	62	263

Table 2 shows the distribution by type of accidents of tugboats. The ratio of accidents by collision is the highest. However, other most vessels have their likes. According to the result that accidents of tugboat were analyzed, many accidents occurred by following causes.

① Restricted maneuverability relatively to other general vessels

② Unreasonable sailing at bad weather

③ Operation of long hours by master, one person

④ Insufficiency of safety facilities in the barge

⑤ Passing undistinguishable towing line of fishing vessels and small ships

⑥ Lacking of maneuverable ability and knowledge about maneuverable characteristic of tugboats

There are a lot of causes of accidents, but most accidents happened by the above causes.

3. Problems of human element part

In the tug-barge of less than 200 gross tonnage engaged on near-coastal voyages or short shipping, the danger of accidents caused by fatigue accumulation exist because only one master carries out his duty for the long-distance despite restricted maneuverability due to stern towing.

Even if a tug-barge takes 40 to 50 hours to navigate between Busan and Incheon by 5 knots, only one master is taking full charge of operation. To solve this problem in real scene, unqualified chief engineers are carrying out as his substitute.

According to the result of a survey for tug-barge's operators, the percentage of number of crew on the vessel showed that 9 percent for one person, 35 percent for 2 persons, 28 percent for 3 persons. Most barges are operating with only minimum crew based on the certificate of minimal standards by the Seafarer's Act and the minimum manning standards by Enforcement Ordinance of the Ship Officer's Act. Furthermore, in the a tugboat connected with a barge of more than 1600 tons, it defines to take on board more than one additional authorized person whose rank same as the lowest officer's manning standards or exactly lower level from the officer's minimum manning standards the first 1, 2 of 1, in Enforcement Ordinance of the Ship Officer's Act.

But according to a survey of operational situation of tug-barges, barges of less than 1600 gross tonnage account for 95% of the registered barges. In the tugboat combined with a barge of less than 1600 gross tonnage, despite the long-navigation, only one master takes full charge of watch because the rule is not applied that more than one additional

crew should be onboard.

According to another result of a survey for tug-barge's companies and operators, tug-barge's crews are getting older. The reason that one master takes full charge of watch for hours because it's difficult to look for crew who possess qualification that allows to work in tug-barge and economic scale of shipowner is small.

Table 3 Minimum manning standards of the Ship Officer's Act

(Unit: Gross tons)

Navigational area	Size	Crew	Qualification	
			Passenger ships	Except Passenger
Flat waters	below 200	Master	5th class	6th class
	below 600 above 200	Master	4th class	5th class
	above 1600	Master Chief	3rd class 4th class	4th class 5th class
Coastal waters Coast, greater coast, coastal waters	below 200	Master Chief	5th class 6th class	6th class
	below 500 above 200	Master Chief	4th class 5th class	5th class 6th class
	below 1600 above 500	Master Chief	3rd class 5th class	4th class 5th class (6th in fishing)
	below 3000 above 1600	Master Chief	3rd class 4th class	3rd class 5th class
	above 3000	Master Chief Second	2nd class 3rd class 4th class	3rd class 4th class 5th class

4. The system of certificate of officers in charge of a navigational watch

4.1 Contents of the certificate

The system of certificate of officers in charge of a navigational watch is to issue certificate that can act for officer in duty to the unlicensed watch-keeping personnel or unqualified chief engineer when they complete the regular course of education. If they carry out their duty with the certificate, they can solve the illegal status of the work by performing navigational watch under the supervision of qualified deck's officers.

4.2 Legal basis.

Every candidate for certification as officer in charge of a navigational watch on a seagoing ship of less than 500 gross tonnage engaged on near-coastal voyages or short shipping

shall :

- 1) be not less than 18 years of age
- 2) have completed ;

① special training, including an adequate period of appropriate seagoing service as required by the administration ; or

② approved seagoing service in the deck department of no less than three years (STCW annex II/3.4)

4.3 Proposals of requirement of qualification, objects of education, training period, contents and the term of validity

1) Requirement of qualification

① Chief engineer by article 22, paragraph 1 in Enforcement Ordinance of the Ship Officer's Act in the table 3.

② Deck watch-keeping ratings by article 41 of Enforcement regulations of the Seafarer's Act.

2) Objects of education

The objects of education are deck watch-keeping ratings or chief engineers qualified in accordance with above requirements and wish to act for officers in charge of navigational watch on the combined tug-barges of less than 200 gross tonnage engaged on near-coastal voyages.

3) Proposals of training period and contents of education

① Training period : It was construed to need at least 1 week of training period to be issued the certificate, according to the analysis of training period per various process, such as educations about license acquisition, license revalidation, coastline job in article 2 of Enforcement regulations of the Seafarer's Act.

② Contents of education and subjects : Following subjects should be opened as a minimum contents of education required by tug-barges' navigational watch : vessel operation, sea traffic regulations, radar navigation, tug-barge's navigational watch, maneuverability of tug-barge and operational skill.

③ Contents of education are comprised of theoretical lectures like the quality and the period of education per training courses in the article 2 of Enforcement regulations of the Ship Officer's Act in operation, practical test and simulation.

④ Courses of education should be opened so that experienced operators of tug-barges can educate an in-service techniques substantially.

4) The term of validity : The validity does by 5 years.

4.4 Amendments of related regulation

Enforcement Ordinance of the Ship Officer's Act

A Study on Certification of Officers in charge of a Navigational Watch on Tug-barges

supplements contents about certificate of officers in charge of a navigational watch to manning standards of deck department of vessel over 30 tons of the minimum manning standards in the article 22, paragraph 1, attached table 3 . That is, it supplements contents of remarks 1.3 to existing regulation remarks as table 4.

Table 4 Amendments of enforcement ordinance of the Ship Officer's Act

Present law	Revised bill
Remarks 1. In case of tugboats combined by barges and ropes, it should be on board an authorized person who is upper one level more than above manning standards as a master.	Remarks 1~2. (Same as the left side)
2 of 1. In case of tugboats connected with barges of more than 1600 tons, it should be onboard more than one additional authorized person whose level is same as the lowest officer's manning standards of above table or exactly lower level. (establishment)	3 of 1. In case that chief engineer or watch-keeping ratings of deck dept. complete educations of certificate of officers in charge of a navigational watch, they can act for officers in duties on the combined tug-barges of less than 200 tons engaged on near-coastal voyages.

1) Amendments of regulations about objects of education, contents of education, training period

Regulations about objects of education, contents of education and training period by introduction of certificate of officers in charge of a navigational watch, revise article 2 and attached table 1 of Enforcement regulations of the Ship Officer's Act.

<Amendments of article 2 and attached table 1 of Enforcement regulations of the Ship Officer's Act >.

1. Amendments of article 2 of Enforcement regulations of the Ship Officer's Act

supplements : following contents of 6 to paragraph ① of existing regulation.

Article 2 (Education)

① An attached table 1 indicates a object of education, contents of education and training period of following subparagraph

1. Education of license acquisition in accordance with the provision of article 5, paragraph 1, subparagraph 4 of the Ships' Officers Act. (hereinafter defined as "the Law"), and the provision of article 5, paragraph 1, and article 15 of Enforcement Ordinance of the Ship Officer's Act. (hereinafter defined as "the Ordinance")

2. Education of license revalidation in accordance with the provision of article 7, paragraph 3, subparagraph 2 of the Law.

3. Supplementary education in accordance with the provision of article 16 of the Law.

4. Education exempt from a written test in accordance with the provision of article 13, paragraph 2 of the Ordinance.

4.2 Education exempt from a personal interview in accordance with the provision of article 13, paragraph 6 of the Ordinance.

5. Education of duties on small vessel in accordance with the provision of attached table 3, subparagraph 4 of the Ordinance.

6. Education for certification of officer in charge of a navigational watch in accordance with the provision of an attached table 3, subparagraph 1 of the Ordinance.

Table 5 Amendments of article 2 and attached table 1 of Enforcement regulations of the Ship Officer's Act

Present Law	Revised bill
Art 2, para. 1 1. Education of license acquisition by the provision of art. 5, para 1, subparagraph 4 of the Ships' Officers Act. (hereinafter defined as "the Law"), and art. 5, para. 1, and art. 15, para. 2 of Enforcement Ordinance of the Ship Officer's Act (hereinafter defined as "the Ordinance")	1~5 (Same as the left side)
2. Education of license revalidation by regulation of art. 7, para. 3, subparagraph 2 of the Law.	6. Education for certification of officers in charge of a navigational watch in accordance with the provision of an attached table 3, subparagraph 1 of the Ordinance.
3. Supplementary education by art. 16 of the Law	
4. Exemption education of written examination by art 13, para. 2 of the Ordinance	
4.2 Education for personal interview exemption by art. 13, para. 6, of the Ordinance.	
5. Education of duties on small vessel by the provision of attached table 3 subparagraph 4, of the Ordinance. (establishment)	

2. Amendments of article 2, paragraph 1, attached table 1 of Enforcement regulations of the Ship Officer's Act

supplements : following contents of certification of officers in charge of a navigational watch to existing regulation.

Table 6 Amendments of regulation relevant to education

Course	Object person	Contents	Period
Certificate of performing duties	Person wish to act for officers in duty for tug-barges by the provision of attached table 3, Subparagraph 1 of the Ordinance.	Watch and operation of tug-barge	one week

2) Regulation about issuance of certification of officer in charge of a navigational watch

Certification of officers in charge of a navigational watch shall be also issued a certificate for completion of education like education of license acquisition, license revalidation, supplementary education, educations exempt from written test and personal interview by the provision of article 2 of Enforcement regulations of the Ship Officer's Act.

Chief engineer or watch-keeping ratings of deck dept. who wish to carry on navigational watch on combined tug-barges of less than 200 tons engaged on near-coastal voyages shall take a required practical test after they complete educations, but only those who pass the regular score shall be taken a completion of education.

Article 2 (Education)

② A person who executes education paragraph 1 shall :

1. deliver a certificate for completion of education by the provision of article 57, paragraph 4 of Enforcement regulations of the Ship Officer's Act.

2. record facts about completion of education to sections of training and education in seaman's pocketbook.

③ A person who completes course of education by the provision of an attached table 1 as object of education, can request to the chief of Regional Maritime Affairs & Fisheries Office or the head sent from the Fisheries or the chief of a designated educational institution to record facts about completion of education.

3) Regulation relevant to the term of validity

The term of validity of certification of officers in charge of

a navigational watch does by 5 years. A certificate holder shall be educated once a 5 years. And such new regulations shall be established in remarks of attached table 1, article 2, paragraph 1 of Enforcement regulations of the Ship Officer's Act.

5. Conclusion

This paper proposed an introduction about certification of officers in charge of a navigational watch as improvements to solve problems including full charge by one master for long hours, navigational watch by the unqualified chief engineers, and operator shortage of tug-barges, and so on.

Though tug-barges' crews are getting older, the number of masters, chief engineers and other crews are insufficient. To solve these problems, we need to produce many crew through the system of issuance about certification of officers in charge of navigational watch by taking education for the basic deck's watch to unqualified person such as chief engineer. Furthermore, an issuance system of certification of officers in charge of a navigational watch is to educate crew who have no officer's licences and can make act for officers in duties. If they complete course of educations, they can receive a substitute qualification and carry on navigational watch under the supervision of qualified deck's officers. It was construed to need revision of following relevant laws to introduce a system of certificate of officers in charge of a navigational watch for safe operation of tug-barges.

Enforcement Ordinance of the Ship Officer's Act supplements contents about certification of officers in charge of a navigational watch to deck manning standards of vessel over 30 tons of the minimum manning standards subparagraph 1 of article 22, paragraph 1 in the table 3. Regulations about objects of education, contents of education and training period by introduction of certification of officers in charge of a navigational watch, revise article 2 and attached table 1 of Enforcement regulations of the Ship Officer's Act.

Certification of officers in charge of a navigational watch shall be also issued a certificate for completion of education like education of license acquisition, license revalidation, supplementary education, educations exempt from a written test and a personal interview by the provision of article 2 of Enforcement regulations of the Ship Officer's Act.

Finally, this paper is considered that the problems of taking full charge of longtime navigation by only one master, navigational watch by unqualified chief engineer and

shortage of operators will be settled by introducing the system of certification of officers in charge of a navigational watch.

References

- [1] Lee, B. G.(2008), "Evaluation on Prevention Activities of Pollution by HEBEI SPRIT and Hereafter Subjects", Marine Environment Safety Institute a Scientific Meeting for the Announcement in Spring.
- [2] Im, N. G., Park, S. H. and Park, G. G.(2006), "A Study on Tug-barges' Present Safety Condition", Marine Environment Safety Institute, Vol.12, No.1, pp.61~66.
- [3] Maritime-Fisheries Affairs Ministry(2003), "Accidents of Combined Tug-barges, Reduction Countermeasure".
- [4] Maritime-Fisheries Affairs Ministry(2005), "Research Services of Safe Operation Plan of Combined Tug-barges".
- [5] Notification of Maritime-Fisheries Affairs Ministry (2005), "Standards of Barge's Structures an Equipments".
- [6] Park, S. H., "A Study on the System of Certificate of Officer in Charge of a Navigational Watch for tug-barges' safe operation", pp.91-96.
- [7] The Seafarer's Act.
- [8] The Ship's Officers Act, "Enforcement regulations of the Ship Officer's Act".
- [9] The International Convention on Standards of Training, "Certification and Watch-keeping for Seafarers", 1978, as amended in 1995.

Received 21 August 2008

Revised 26 December 2008

Accepted 29 December 2008