



# 談漁船火災防範 之相關國際規範

## Maritime Casualties of Fishing Vessels Relevant International Codes of Fire Prevention

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### 壹、前言

俗云「水、火無情。」對於一個與海為伍的人而言，為了生活每天都必須要「迎風戰湧」，漂泊在無垠的浩瀚大海，迎接一波波洶湧浪濤不停的考驗。

台灣四面環海，是個典型的島國，海洋漁業向來發達。根據農委會漁業署統計，目前擁有大、小漁船（筏）二萬五千三百餘艘，漁業從業人數多達三十三萬六千餘人。然依勞保機關統計，台灣地區漁民之勞保職災死亡百萬人率為75，約是同期全台灣地區產業勞保職災死亡百萬人率38的2倍。處在又是水又是火交相環繞的特殊工作條件下，漁船作業中只要稍有不慎，可能就會遭水淹或火吻，無怪乎俗諺說「行船走馬三分命」。到底漁船海難能否預防？難道這就是討海人的宿命，只能

### Part I. Foreword :

"Water and fire are merciless", as the old saying goes. For people constantly work at sea, it is their everyday life to "work against the wind and sea" and drift at the endless sea while facing raging challenges one after another.

Taiwan is surrounded by sea. It is a typical island country and its fishing industry has been developed prosperously. According to the statistics from Fisheries Agency, Council of Agriculture, there are total more than 25300 big and small fishing vessels (rafts) and more than 336,000 people in fishing industry in Taiwan. However, according to the statistics from the labor insurance agency, the occupational mortality rate is per million fishermen by 75 people, approximately 2 times of the occupational mortality rate per million workers at the same period in Taiwan area which is 38. Working in such a unique condition which water and fire coexist, fishing vessels operating at sea could easily be flooded or being on fire if anything goes with



眼睜睜的束手接受上蒼如此殘忍的安排嗎？

## 貳、漁船海難定義的省思

漁船，不論在航行作業中，或是靠泊港口期間，隨時都有可能遭到無情水、火的偷襲，稍有不慎就可能釀成傷財奪命的漁船海難案件。雖然造成漁船海難的原因很多，除了人為疏失以外，也有部分係肇自大自然的不可抗力因素。不過一般來說，習慣上大家都將之稱為「海難」。

惟根據1982年聯合國海洋公約第221條所揭示之「海難」(Maritime Casualty)，係指船隻碰撞、擱淺或其他航行事故，或船上或船外所發生對船隻或船貨造成重大損害或重大損害的迫切威脅的其他事故。另依國際海事組織(International Maritime Organization; IMO) 1986年海上安全委員會第433號通函所附海事報告標準格式，係將「海難」分為：碰撞與觸撞(Collision and Contacts)、觸礁與擱淺(Stranding and Grounding)、浸水與沈沒(Floodings and Foundering)、橫傾與傾覆(Lists and Capsizing)、火災與爆炸(Fires and Explosions)、船體與機器損壞(Hull and Machinery Damage)、其他(Others)及狀況不詳(Unknown)等8大類別。

雖然我國現行「災害防救法」第2條，已將「海難」明定為各級主管機關應為防救的災害之一，並指定交通部作為中央海難災害防救業務之主管機關。同時在該法施行細則第2條，更將「海難」明確界定為：係指船舶發生故障、沈沒、擱淺、碰撞、失火、爆炸或其他船舶、貨載、船員或旅客之非常事故。惟交通部在依據商港法第36條授權所訂定法規命令「海難救護機構設立及管理辦法」第2條，所揭示之「海難」，卻係指船舶擱淺、沈沒、碰撞、失火、爆炸、洩漏或其他有關船舶、船員或旅客之非常事故。顯與災害防救法體系所揭示之海難定義有間，非但排除常見的船舶「故障」並刻意增列「洩漏」一項。

另外，中央漁政主管機關－行政院農業委員會在依漁業法第53條之1授權，所訂頒之「台灣地區漁船海難救護互助辦法」第2條，係將「海難」定義為漁船故障、沈沒、碰撞、擱淺、失火、爆炸、洩漏、遭劫或

carelessness. No wonder an old saying goes like this: "Destinies of Fishermen, when sailing out at sea, are in the lap of the gods". Can maritime casualties of fishing vessels be prevented? Are fishermen destined to accept whatever cruel arrangements that God has for them?

## Part II. Reflection of the definition for maritime casualties of fishing vessels

Fishing vessels, whether operating at sea or berthing in port, could be damaged by fierce water or fire anytime. If not being dealt properly, it could deteriorate to a maritime casualty that causes property loss or personnel injuries. Although causes for maritime casualties vary, besides human carelessness, some are caused by force majeure. Nevertheless, in general, we define them as maritime casualties.

According to article 221, United Nations Convention on the Law of the Sea 1982, "maritime casualty" refers to collisions, groundings or other navigational incidents of vessels, or other occurrence on board of a vessel or external to its resulting in material damage or imminent threat of material damage to a vessel or cargo. In addition, according to the standard maritime report attached in No. 433 Circular of Maritime Safety Committee, International Maritime Organization, 1986, maritime casualty refers to Collision and Contacts, Stranding and Grounding, Floodings and Foundering, Lists and Capsizing, Fires and Explosions, Hull and Machinery Damage, others and Unknown.

According to article 2 of the "Disaster Prevention and Protection Act" of ROC, prevention / rescue of maritime casualties is the responsibilities of competent authorities of all levels, and Ministry of Transportation and Communications was appointed as the central maritime casualty rescue authority. At the meantime, according to article 2 of the "Enforcement Rules of Disaster Prevention and Protection Act", maritime casualty refers to failure, sinking, grounding, collision, accidental fire, explosion of a sea vessel, or any other unusual accident to a sea vessel, cargo, crew members or passengers. Yet, according to article 2 of the "Establishment and Management of Maritime Casualty Rescue Agency Rules" established by Ministry of Transportation and Communications based on article 36 of the "Commercial Harbor Law", maritime casualty refers to grounding, sinking, collision, fire, explosion and leaking of a vessel or any other unusual accident to a vessel, cargo, crew members or passengers. Obviously, "failure" of a vessel has been excluded, however "leaking"





其他有關漁船或船員之非常事故。而該會漁業署所發行之「中華民國台灣地區漁業統計年報」，統計上係先將漁船海難分為：沈沒（Sunk）、破損（Damaged）、失蹤（Missing）、及其他（Others）等四大類，然後對於沈沒及破損兩大類型，則又細分為天災（Casualty）、機械故障（Engine Breakdown）、碰撞（Collision）、漏水（Leakage）、擱淺（Stranded）、失火（Fired）、絞擺（Propeller Twist）及其他（Others）等8種情況。

換言之，就目前國內法而言，在災害防救法規、交通港務及農政漁業等三大類法規體系中，對於「海難」所採取之定義並未一致，且與相關國際公約存有若干差異，同時以農政漁業法規之「海難」定義最為寬鬆。雖然每種法規，皆有其特別強調之立法目的，所以對於「海難」定義，必然也會隨之而有特別考量。但如果因而產生分析比較上的困擾，恐怕就值得深思。

### 參、近三年高雄港轄區漁船火災海難案件分析

雖然航政主管機關與漁政主管機關對「海難」在統計上所採之定義不盡相同，然在2001至2006年間之漁船海難類型統計中，兩主管機關卻共同提供了一項特別值得吾人正視的訊息，就是「火災」所引起的海難案件數據逐年上升，這對討海人所造成之生命、財產上的損失問題，實不容小覷。

有鑑於近來各地漁船火災海難案件頻傳，農委會漁業署為究明漁船火災海難發生之原因，洽請高雄港務局及其所屬分局，提供最近三年（95～97）所受理之漁船相關海事報告資料，經統計該期間之火災海難案件者達33艘，平均每年超過10艘以上漁船曾經遭受祝融侵襲。經分析該等漁船火災海難個案，發現有以下吾人應特別注意的現象：

has been added in the maritime casualty definition by disaster prevention and protection system.

Moreover, according to Article 2 of the "Mutual Assistance for the Rescue of Maritime Casualty of Fishing Vessels in Taiwan area" promulgated by central fisheries authority - Council of Agriculture Executive Yuan, based on the authority of Article 53-1 of the "Fisheries Act", definition of maritime casualty refers to failure, sinking, collision, grounding, fire, explosion, leaking or robbing of a vessel or other unusual accident to a fishing vessel or crew members. Nonetheless, according to Fisheries statistical yearbook Taiwan which is published by Fisheries Agency, maritime casualties of fishing vessels have been categorized statistically as: sunk, damaged, missing and others. Sunk and Damaged are further categorized as casualty, engine breakdown, collision, leakage, stranded, fired, propeller twist and others.

In other words, in terms of domestic laws of ROC, the legal systems of disaster prevention and protection system, transportation and harbor administration system, and agriculture and fisheries system, don't have the same definition with "maritime casualty". Moreover, they all vary from relevant international codes to some degree. Agriculture and fisheries system has the loosest definition of maritime casualty. Each act was stipulated for its own purpose, therefore, different factors were taken into consideration when defining "maritime casualty". Nevertheless, if confusions occur when analyzing, it certainly deserves some serious thoughts on these differences.

### Part III. Case Analysis of Fire Accidents on Fishing Vessels in Kaohsiung Harbor for the Past 3 Years.

Although the statistical definition of "maritime casualty" isn't exactly the same, shipping affairs and fisheries authorities both provide a message worthy of our attention for period of 2001-2006. In this period, the number of maritime casualties of fire accidents in fishing vessels increased annually and had caused lives and property damage of fishermen. It shouldn't be dealt lightly.

Since fire accidents in fishing vessels occurred in various areas have become more and more regular. In order to find out causes of fire accidents, Fisheries Agency, Council of Agriculture has asked Bureau of Kaohsiung Harbor and its branch to provide relevant maritime reports on fishing vessels they dealt with in the past 3 years (2006-2008). The cases happened in this period is in amount of 33, and more than 10 fishing vessels had fire acci-





(一)就漁船材質而言，以塑鋼質(FRP)漁船最容易發生火災，比例高達94%（詳附圖一），至於其他材質（如鋼質、木質發生比例相對較低。也

許這與台灣地區中型漁船材質大部係屬塑鋼質有關，不過也給我們一個警訊，印證塑鋼質漁船應特別注意防火的問題。

(二)從漁船船齡來看，各種船齡之漁船都有可能發生火災，但似乎以集中在船齡15~20年，及20~25年兩個級群之比例較高（詳附圖二）。

(三)以漁船噸級別來比較，顯然是以未滿100噸的沿、近海漁船為多，並以50~100噸級漁船為最高；其次則

為20~50噸級之漁船（詳附圖三），或許這跟前面所述台灣地區100噸以下之中、小型漁船大多是FRP材質有一致的關連性。

dents per year. After analyzing these cases, we find the following results worthy of our attention:

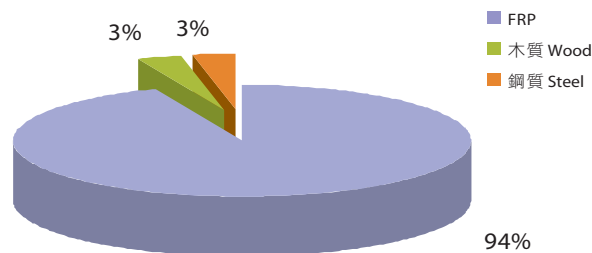
(I) Fishing vessel material: fishing vessels made of FRP are most prone to fire. Fishing vessels made of FRP have a 94 % rate of fire occurrence. (As figure 1) However fishing vessels made of other materials have a lower rate. This may have something to do with the fact that most of medium-sized fishing vessels in Taiwan are made of FRP. It also sends out a warning that we should pay extra attention to fire prevention on FRP fishing vessels.

(II) From the view of Age of fishing vessels, fire occurred at different range. However, it seems like the trend is prone to break out on fishing vessels aged 15 - 20, and 20-25. (Please see Figure 2)

(III) If we compare tonnages of fishing vessels, obviously, fishing vessels under 100 tons, and offshore fishing boats are most prone to fire, those fishing vessels of 50- 100 tons have the highest number of fire accidents (Please see Figure 3). This may be in consistency with the fact that most of fishing boats under 100 tons are made of FRP in Taiwan as we previously stated.

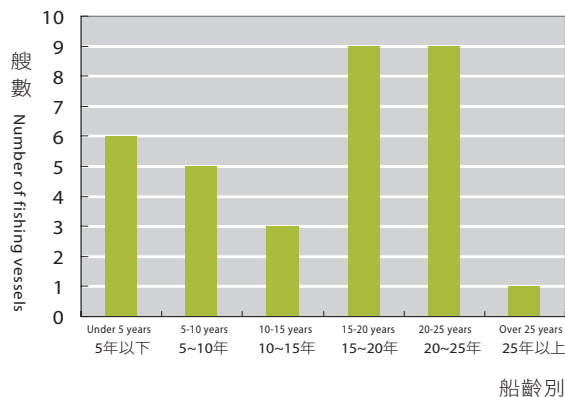
圖一、發生火災之漁船材質比例圖

Figure 1 Pie Chart of fishing vessels materials for fire accidents



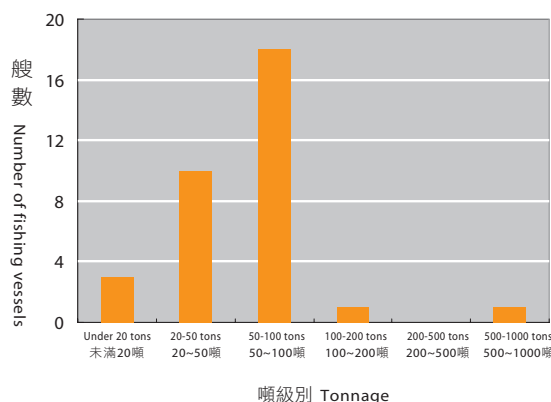
圖二、發生火災漁船船齡比較

Figure 2 Comparison of fire accidents numbers of fishing vessels at different ages



圖三、發生火災之漁船噸級別比較

Figure 3 Comparison of fire accidents numbers of fishing vessels of different tonnages







(四) 就漁船火災發生地點分佈而言，以在海上作業中發生比例最高達79%；其次為靠港進行修繕、補給時，發生比例為15%；其他則為靠港期間遭雷

擊失火，或受他船失火波及者計6%（詳附圖四）。當然，其可能產生之危害程度也以在海上作業中最高，而且救援的困難度也最大。

(五) 若以漁船火災發生時間來看，以下午（12~18時）發生比例最高達34%；其次是上午（6~12時）及晚上（18~24時）皆為24%；至於凌晨（0~6時）僅為18%（詳附圖五）。換言之，通常以下半天（即12~24時）比較容易發生火災。

(六) 就漁船發生火災之起火點及原因來說，以機艙失火最高達88%，其次船尾、駕駛

(IV) Place of fire occurrence: the rate of fire onboard fishing vessels operating at sea is as high as 79 %; the rate of fire onboard fishing vessels berthing at port for maintenance

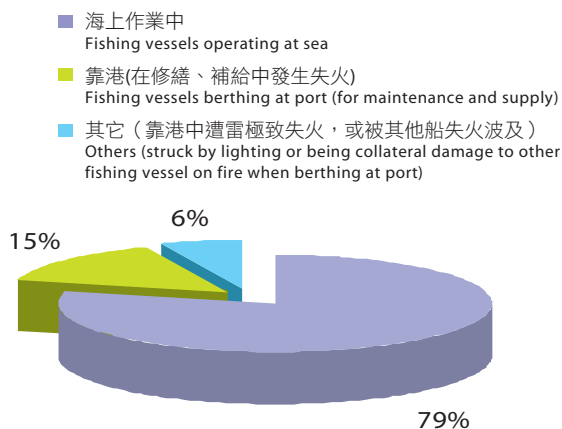
and supply is 15%; rate of fire onboard fishing vessels for other causes such as struck by lighting or being collateral damage to other fishing vessel on fire is 6% (Please see Figure 4). Of course, fishing vessels operating at sea have the highest potential of being seriously damaged if fire broke out onboard and such type of maritime casualty has the highest difficulty in rescuing.

(V) Time for Fire Occurrence: the rate of time for fire occurrence in the afternoon ( 12-18 pm ) is as high as 34% ; rate of time for fire occurrence in the morning ( 6-12 am ) and evening ( 18-24 pm ) are both 24% ; rate of time for fire occurrence in the early morning ( 0 - 6 am ) is only 18% ( Please see Figure 5). In other words, fire is prone to occur in the 2nd half-day (12-24 hour).

(VI) Starting Point of Fire and Its Causes: rate of fire occurrence in engine rooms is as high as 88%, rates of fire occurrence in stern, Bridge and kitchen are all 3 %. Rate of collateral damage by other fishing vessels on fire is 3 %. For fire breaking out in engine rooms, rate of fire caused by electricity malfunction (including electricity power cords, generator switchboards, batteries, exhaust fans, gen-

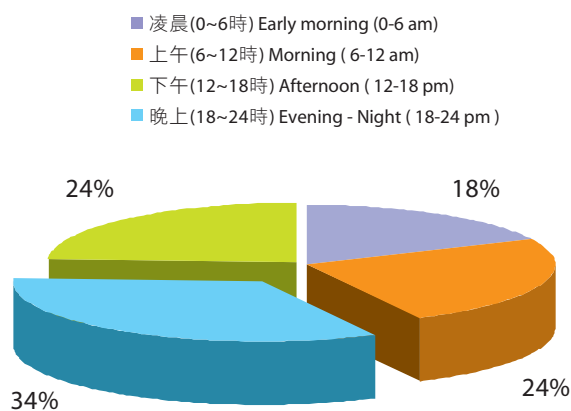
圖四、漁船火災發生地點分析

Figure 4 Place of Fire Occurrence



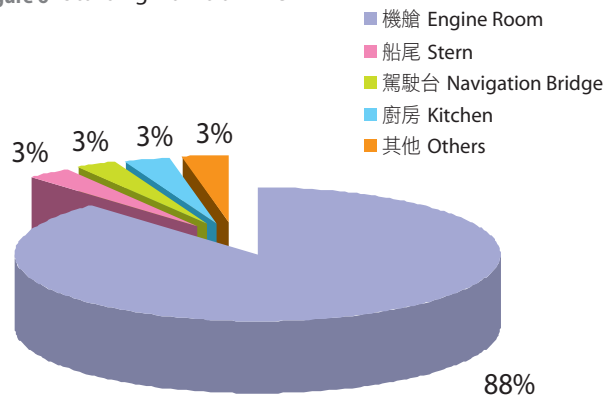
圖五、漁船火災發生之時間分析

Figure 5 Time for Fire Occurrence



圖六、漁船火災發生之起火點分析

Figure 6 Starting Point of Fire





台及廚房失火則均為3%，其他如靠泊碼頭期間被他船失火波及者亦為3%。而前述機艙失火案件中，因電（包括電線、發電機電盤、電瓶、抽風機、發電機、電源控制箱、配電

盤等起火等）而引起者高達36%，遭雷擊造成機艙失火者為9%，因檢修人工抽菸不慎引起失火者4%，另外尚有51%則為原因不明或爆炸而引起機艙失火者（詳附圖六、七）。

根據以上實際案例分析，顯見漁船發生火災之原因，與其他如碰撞、擱淺等漁船海難相仿，仍不外乎是肇自於「天災」與「人禍」。所謂「天災」當然包括因颱風、大風浪、海嘯等大自然不可抗拒之現象所致者悉屬之；至於「人禍」，根據世界各海事先進國家的海難原因分析，「人為疏失」(Human error)實係釀成船舶海難發生的最常見原因。既然大多數的漁船海難意外事故，是由於人員「可以且應該」避免的錯誤所致，當然應該可以藉由人員素質的提升，來降低海難事故發生的機率。

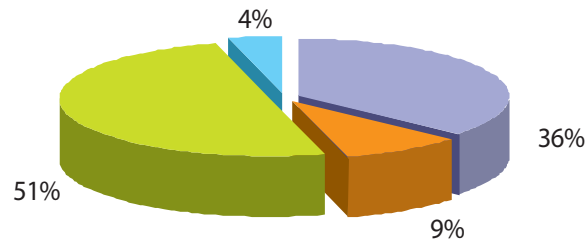
#### 肆、漁船海難—火災之相關國際規範概況

其實國際勞工組織(International Labor Organization; ILO)早在1962年召集之捕撈業工作條件委員會，即通過一個旨在研究漁船上船員工作條件相關問題的決議，建議制定一個實用的國際規則，來處理漁船和船員之航行作業和職業方面的安全問題，敦促與聯合國糧農組織(Food and Agriculture Organization of the United Nations; FAO)，以及當時的政府間海事協商組織(IMCO，現以改名為國際海事組織，即IMO)，共同合作建立一個合適機構來起草此一國際規範的可能性。

圖七、漁船機艙失火發生原因分析

Figure 7 Analysis of Causes for Fire Occurred in Engine Room

- 電的問題 Electricity
- 雷擊所致 struck by lighting
- 原因不明或爆炸引起 Unknown Causes or Explosions
- 檢修不慎引起 Bad Maintenance



erators, power control units, power panels) is as high as 36%. Rate of fire caused by lighting is 9%, rate of fire caused by maintenance staff smoking is 4%. Other 51% cases are caused by unknown causes or explosions in engine rooms. (Please see Figure 6 and 7)

According to above case analysis, it is obvious that causes for fire onboard fishing vessels are similar to maritime casualties of fishing vessels such as collision and grounding which are either

"natural disasters beyond human control" or "Human Error". Natural disaster refers to disasters beyond human control, such as typhoons, raging waters, and tsunamis. As for Human Error, according to the most common causes of maritime casualties analyzed by advanced maritime counties, "Human Error" is indeed the most common cause for maritime casualties. Since most of maritime casualties of fishing vessels are caused by "avoidable" mistakes, rate of maritime casualties could be decreased by improvements of personnel quality.

#### Part IV. Maritime Casualties of Fishing Vessels - Relevant International Codes of Fire Prevention

Actually, as early as 1962, International Labor Organization called the committee of fishing work conditions and reached a resolution to study relevant working issues for personnel working at fishing vessels. It was suggested that a practical international rule to be established in order to deal with safety issues for fishing vessels and crew personnel operating at sea and safety issues about the occupation itself. Food and Agriculture Organization of the United Nations, the then Inter-Governmental Maritime Consultative Organization (IMCO, now being renamed as International Maritime Organization - IMO) and International Labor Organization were urged to work on the possibilities of establishing an organization to draw up such an international code.

Those 3 organizations, by taking their willingness of cooperation within their respective powers into account and including all kinds of safety issues of fishing vessels and crew personnel





該三個組織為慮及在各自職權範圍內的合作意願，以及漁船和船員安全的所有問題悉應納入漁船安全規則的範圍，爰就合作原則和相互關注領域，以及在漁船和船員方面的職責，共同達成一個協議，承認各自主管領域分別為：FAO負責一般漁業起草漁業總則部分，ILO負責起草捕撈業勞工部分，IMO負責起草海上人命、船舶及設備安全部分。並根據該協議，同意將其命名為「漁民和漁船安全規則」，且分為A、B兩部分，其中A部分為針對船長和船員有關作業和職業的要求，於1968年日內瓦勞工組織總部召開三個組織有關漁船船上安全專家聯合會議即獲通過；B部分則係針對造船業者和船東有關漁船建造及設備之要求，此部分在1973與1974年及1975年亦分別獲得海事組織、糧農組織與勞工組織之贊同。

各相關國際公約、規則、議定書及指南等內容，悉把如何強化漁船及船員防火、探火、滅火和救火等課題納入相關規範，顯見國際間對防範漁船火災問題的重視。不過，就整體而言，不外乎仍然是著重在以下兩個面向：

### （一）在漁船之設計、建造和裝備等硬體改善方面

藉由規範從漁船的設計、建造、結構、材料及設備與裝置之強度等，將其具體表現在「漁民和漁船安全規則」B部分（漁船構造和設備的安全和衛生要求）、「1977年托列莫利諾斯國際漁船安全公約」（Torremolinos International Convention for the Safety of Fishing Vessels, 1977）和「1993年托列莫利諾斯議定書」（Torremolinos Protocol of 1993 Relating to the International Convention for the Safety of Fishing Vessels, 1997; SFV PROT 1993），以及「小型漁船設計、構造和設備自願性指南」（The Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels）等相關規則、公約和指南之內容中。

#### 1. 「漁民和漁船安全規則」B部分－漁船構造和設備的安全和衛生要求

基本上，本規則B部分旨在提供關於漁船設計、構造和設備的信息，來促進漁船安全和保障船

在的 safety code of fishing vessel, have reached an agreement, based on their willingness of cooperation and issues each concerns about as well as responsibilities for fishing vessels and crew personnel, on fields they all are responsible respectively: FAO is responsible for drawing up general rules for fisheries in general. ILO is responsible for drawing up codes for fishing industry and IMO is responsible for drawing up codes of safety for crew personnel, vessels and equipment. According to the agreement, this international code is named "Code of Safety for Fishermen and Fishing Vessels" and it was divided into Part A and B. Part A is about relevant operational and occupational requirements for skippers and crew members, and it was passed in a joint convention participated by fishing vessel safety experts. This convention was held by the 3 organizations at headquarter of International Labor Organization in Geneva, 1968. Part B is about requirements of construction and equipment of fishing vessels for ship manufacturers and ship owners. Part B was agreed by, respectively, IMO in 1972, FAO in 1974 and ILO in 1975.

The content of relevant international codes, rules, protocols and guidelines centers on issues of how to strengthen fishing vessel and crew personnel's abilities in fire prevention, fire detection, fire extinction, and fire fighting in the relevant rules. We can see how much the global society values fire prevention for fishing vessels. However, all in all, the emphasis still spotlighted the following 2 parts:

#### （I）Improvements on hardware facilities such as design, building and equipment of fishing vessels:

By regulate the design, building, structure, material and equipment of vessels, the international laws are embodied in the content of following rules, conventions and guidelines, such as "Regulation for safety of Fishermen and Fishing Vessels" of Part B (requirements for safety and sanitation of structure and equipment of fishing vessels), "Torremolinos International Convention for the Safety of Fishing Vessels, 1997", "Torremolinos Protocol of 1993 Relating to the International Convention for the Safety of Fishing Vessels, 1997", and "The Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels":

#### 1. "Code of Safety for Fishermen and Fishing Vessels", Part B - Requirements of Safety and Hygiene for the Construction and Equipment of Fishing Vessels.

Basically, Part B of this code is to provide information for the design, construction and equipment of fishing vessels in order to promote safety for fishing ves-





員安全與健康。不過本規則只是作為各國家制定此類法規的指導原則，不能直接用來作為該國法律規章，也無法直接取代為有關漁船和船員安全的國際文件。本規則屬於自願性質，不具強制力，僅係適於提供船長24公尺以上的漁船，作為保障其安全和船員健康之最低要求。至於船長12公尺以上未滿24公尺之漁船部分，則係另以「小型漁船設計、構造和設備自願性指南」作為指導綱要。

## 2. 小型漁船設計、建造和裝備自願性指南

鑑於1977年召開國際漁船安全會議制定通過之「托列莫利諾斯國際漁船安全公約」，僅適用於長度24公尺以上的漁船，而世界上大部分漁船都未滿24公尺，為了彌補此一缺失，該會議乃建議海事組織應繼續為該類漁船制定設計、建造和裝備之安全標準，並曾經糧農組織、勞工組織及海事組織，共同完成本自願性指南之原案文稿，但因有人指出該文稿部分內容仍需進一步研究，致延宕迄2004年10月，2005年3月及6月始分別獲得該三個組織修訂通過。

本自願性指南內容含括11章及6個附件，其中，第5章亦是專門針對12公尺以上未滿24公尺新造漁船之防火、探火、滅火及消防所規劃的。內容包括漁船結構及材質、通風系統、取暖設備、儲氣瓶和危險品的存放、脫險通道、自動失火警報和偵測系統、消防泵的數量及排量與位置、消防總管、消火栓及消防水帶和水槍、手提式滅火器、便攜式滅火器、機器處所的滅火設備、滅火設備的即刻使用性，以及可允許配備的代用品等之具體建議性指導規範。

## 3. 托列莫利諾斯國際漁船安全公約及其相關議定書

基本上，不論是1977年的國際漁船安全公約本身，或1993年之該公約議定書，在第5章均係針對漁船防火、探火、滅火及消防之專門規範。惟公約本身係將本章區分為：長度55公尺以上漁船的防火安全措施，以及長度小於55公尺漁船防火安全措施二部分。但1993年之議

sels and protect safety and health of crew personnel. However, this code can only be applied as guidelines for countries when setting up relevant requirements. It can't be used directly by any country as part of its law, nor can it replace directly relevant international documentations of safety for fishing vessels and crew personnel. This code is voluntary, not mandatory and is only applicable to fishing vessels over 24 meters in length as minimum level of safety for fishing vessels and health for crew personnel. Fishing vessels over 12 meters in length but less than 24 meters in length should refer to "The Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels" as guidelines.

## 2. The Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels

Seeing that "Toremolinos International Convention for the Safety of fishing Vessels" established / passed by the International Convention for safety of Fishing Vessel, 1997 is only applicable to fishing vessels over 24 meters in length. Nonetheless, most fishing vessels in the world are less than 24 meters in length. To make up for such a drawback, the convention suggested that International Maritime Organization shall keep on establishing safety standards for the design, construction and equipment of fishing vessels. Thus, FAO, IMO and ILO participated in drawing up the original draft of the voluntary guidelines. However, because some people pointed out some of the content in the guidelines needed to be further studied, the guidelines weren't passed by the said 3 organizations until October, 2004, March, 2005 and June, 2005, respectively.

The voluntary guidelines include 11 chapters and 6 appendixes. Among them, Chapter 5 is especially designed for fire prevention, fire detection, fire extinction and fire





定書第5章，則係將其調整為以下三部分：part A—總則 (General)；part B—長度60公尺以上漁船的防火安全措施 (Fire safety measures in vessels of 60 meters in length and over)；part C—長度45公尺以上未滿60公尺漁船的防火安全措施 (Fire safety measures in vessels of 45 meters in length and over but less than 60 meters in length)。此議定書目前已有保加利亞 (Bulgaria)、克羅埃西亞 (Croatia)、古巴 (Cuba)、丹麥 (Denmark)、法國 (France)、德國 (Germany)、冰島 (Iceland)、愛爾蘭 (Ireland)、義大利 (Italy)、吉里巴斯 (Kiribati)、荷蘭 (Netherlands)、挪威 (Norway)、聖克萊斯多福尼維斯 (Saint Kitts and Nevis)、西班牙 (Spain)、瑞典 (Sweden) 等15個國家批准，但迄未生效。

## (二) 在有關船員的教育、培訓方面

為防止或減少漁船火災海難之發生，雖然已有前述三個專門針對漁船防火、探火、滅火急消防之相關國際規則、自願性指南、公約及其議定書。但沒有任何的先進技術或設備，可以確保完全消弭漁船上可能發生火災的潛在風險，唯有同時配合在船員出海前，必須接受一定的專門訓練，提升其排除發生火災潛在風險及面對漁船火災時之處理應變能力，始能達成追求零風險的理想目標。

其中「1995年國際漁船人員培訓、發證和值班標準公約」(International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel, 1995; STCW-F)，以及「2005年漁民和漁船安全規則—A部分」(Code of Safety for Fishermen and Fishing Vessels—part A, 2005) 兩個國際規範，即是專為此而制定的。

fighting of newly built fishing vessels over 12 meters but less than 24 meters in length. Its content includes suggestive guidelines for the construction and materials of fishing vessels, ventilation system, heating system, air reservoir and the storage of dangerous goods, fire exit, automatic fire alarm and detection system, number of fire hydrants and their capacities and locations, fire main pipe, hydrants, and fire hose and watch branches, portable hydrants, fire protection equipment where machinery is, the immediate usage of fire protection equipment and its replacement approved to be equipped with.

### 3. Toremolinos Protocol of 1993 Relating to the International Convention for Safety of Fishing Vessels

Basically, whether it's the 1977 International Convention for the Safety of Fishing Vessels, or the 1993 Protocol, their Chapter 5 is all about requirements for fire prevention, fire detection, fire extinction and fire fighting. However, in this Convention, Chapter 5 is divided as: fire safety measures for vessels over 55 meters in length and for fishing vessels less than 55 meters in length. However, Chapter 5 of 1993 Protocol was further broken down to 3 parts: part A - General; Part B - Fire safety measures in vessels of 60 meters in length and over; Part C - Fire safety measures in vessels of 45 meters in length and over but less than 60 meters in length. So far, this Convention has been approved but not yet put into effect by Governments of Bulgaria, Croatia, Cuba, Denmark, France, Germany, Iceland, Ireland, Italy, Kiribati, Netherlands, Norway, Saint Kitts and Nevis, Spain, Sweden, 15 countries in total.

## (II) Education and Training for Crew Personnel

To prevent or decrease numbers of fire occurrences in fishing vessels, despite the fact that there are 3 relevant international codes, voluntary guidelines, convention and protocol designed to set requirements for fire prevention, fire detection, fire extinction of fishing vessels, no technological advances or equipment can prevent potential risks of fire accidents from breaking out on fishing vessels completely. The only way to accomplish the goal of zero fire accident on fishing vessels is for the crew personnel, before sailing out at sea, to receive proper training, so that their skills to decrease the risks of fire breaking out on sea vessels or response to fire onboard fishing vessels are improved.

International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel,







## 伍、檢討與建議

近年來國際組織為共同防止或降低漁船火災發生，已努力採取系列相關作為，反觀國內情況，近八年雖然來勞政主管機關亦在積極推動降災中程計劃，以及全國職場233減災方案等減災策略，並促使全產業職災死亡百萬人率及職災殘廢百萬人率雙雙下降，減災績效堪稱相當顯著。惟就海洋漁業而言，災害仍然繼續頻傳，漁船火災案件時有所聞。

根據農委會漁業署過去之委託調查報告，分析我國漁船火災海難發生原因，除了很少部分係屬天災或不可抗力外，大多不外乎是因電線短路、船舶設計不良或不當改裝、船舶或機件逾齡使用、冷卻系統損壞、火源管制不當、機艙使用易燃易斷材質管線、機艙長時間無人值班、滅火器材配置不足或擺置不當、配電設備老舊、用電負載過度、機油洩漏、瓦斯或冷媒爆炸、廚房用火不慎、以及亂丟煙蒂等人為或船舶機械因素所致，而且與英、美、日等漁業先進國家一樣，絕大多數之漁船火災起火點是發生在機艙。換言之，歸納漁船火災事故發生原因，多數係因機艙之管理不當、防火及滅火標準不足，以及堆積過多之易燃物，再加上人員滅火應變訓練不足，致無法有效避免火災事故的發生，或及時防止火災事故的擴大。

參酌前述聯合國糧農組織、國際勞工組織、國際海事組織為有效防範及抑制漁船火災事故，一直努力攜手，企圖共同從提升漁船建造設備標準、培養漁民良好的當值應變能力，來建構一個安全海上工作環境的全方位思維，應該值得目前國內分別負責船舶設備檢查、漁船船員訓練及職業安全衛生與災害預防的航政、漁政、勞政主管機關之借鏡，基於政府一體儘速共同成立一個

1995 and Code of Safety for Fishermen and Fishing Vessels - part A, 2005 are 2 international codes set up especially for such goal.

## Part V. Review and Suggestions

Recent years, international organizations have been taking relevant actions actively to prevent or reduce fire occurrence on fishing vessels. As for Taiwan, labor administration agencies have been promoting the mid-range plan for decreasing casualties and 233 accident reduction plan. Their hard working has obviously paid off for the occupational death rate per million people of the whole industry and occupational disaster disability rate per million people have decreased significantly. However,

in terms of fishing industry, the occurrences of casualties are still frequent. We still hear about fire breaking out on fishing vessels from time to time.

By analyzing causes for fire accidents of fishing vessels based on the research commissioned by Fisheries Agency, Council of Agriculture, we find, in addition to a small number of cases caused by natural disasters or disasters beyond human control, most of the accidents were caused by either human error or malfunctioning parts of sea vessels, such as short circuit, bad designs or mal-alteration of fishing vessels, use of vessels or machinery



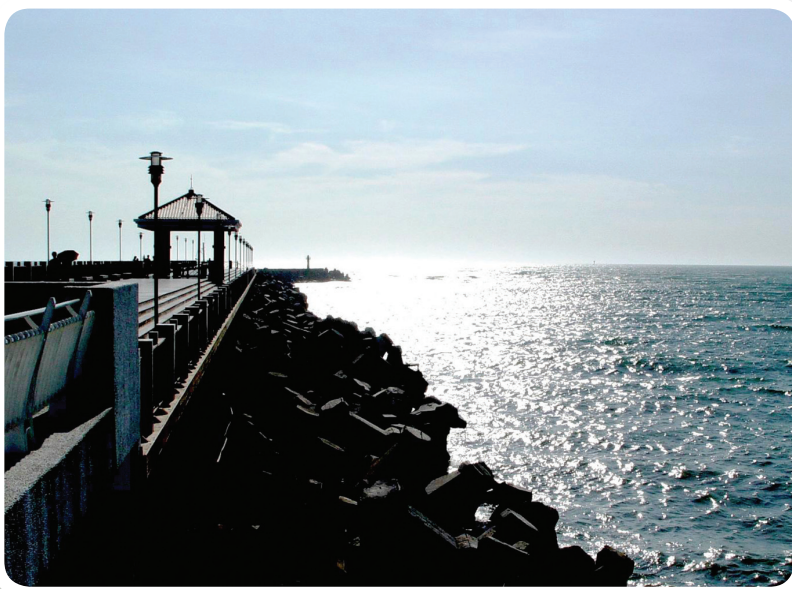


專責小組，規劃期程全面推動國內不合時宜或不足上開相關法規檢討研修事宜，並落實港口管制檢查制度，避免不適任的船員駕駛不適航的漁船，繼續在海上「趴趴走」。

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parts that are too old, damage to cooling system, improper control of fire, use of wires made of flammable or easily broken materials, nobody on duty in the engine room for a long period of time, insufficiency of firefighting equipment or placing firefighting equipment at improper locations, old electrical distribution equipment, electricity overload, engine oil leakage, gas or Freon explosion, careless fire making in kitchen and cigarette butts littering...In addition, like most of the fisheries advanced countries such as UK, USA and Japan, most of fire starting points on fishing vessels are in the engine room. In other words, if we conclude causes for fire accidents on fishing vessels, most of them were caused by bad management of engine room, not-good-enough standards for fire prevention and firefighting, and too many flammable objects stuffed on fishing vessels as well as insufficient firefighting training received by crew members. All these factors have attributed to failure to prevent fire from breaking out effectively or to stop fire spreading in time.

As previously stated, in order to prevent/control fire from breaking out on fishing vessels, FAO, ILO and IMO have been working together in an attempt to construct a comprehensive thinking for safe working environment at sea by improving standards of fishing vessel equipment as well as training crew personnel so that they have proper response abilities to such accidents. Such comprehensive thinking is a good model for the navigation authority, fisheries authority and labor administrative agencies responsible, respectively, for vessel equipment inspection, training for crew personnel and occupational safety and hygiene and disaster prevention in our country. Our government should establish a unit as soon as possible to be in charge of planning stages for promoting review and amendment for requirements that

are out-of-date or insufficient and to actually carry out the control and inspection system at port in order to avoid unfit crew personnel with unfit fishing vessels sailing at sea!

(The author of this article is currently the Chief of Deep Sea Fishery Research and Development Center).

