Investigation of marine casualties

M. Talal El-Shawarby

Follow this and additional works at: https://commons.wmu.se/all_dissertations

Recommended Citation
https://commons.wmu.se/all_dissertations/1248

This Dissertation is brought to you courtesy of Maritime Commons. Open Access items may be downloaded for non-commercial, fair use academic purposes. No items may be hosted on another server or web site without express written permission from the World Maritime University. For more information, please contact library@wmu.se.
THE INVESTIGATION OF MARINE CASUALTIES WITH PARTICULAR REFERENCE TO THE EGYPTIAN SYSTEM, AND IN THIS CONNECTION, A NEW ROLE FOR THE ALEXANDRIA MARITIME TRANSPORT ACADEMY

by

M. Talal El Shawarby
Egypt

A paper submitted to the Faculty of the World Maritime University in partial satisfaction of the requirements for the award of a

MASTER OF SCIENCE DEGREE in
MARITIME EDUCATION AND TRAINING (NAUTICAL).

The contents of this paper reflect my personal views and are not necessarily endorsed by the UNIVERSITY.

Signature: El shawarby
Date: 25 October 1986

Supervised and assessed by:

GUENTHER ZADE
Professor
World Maritime University

Co-assessed by:
Bo HÖGBUM
Head of Nautical Department
Merchant Marine Academy
Kalmar, Sweden
Visiting Professor World Maritime University
CONTENTS

Introduction

Chapter I: Types of Marine Casualties

1. The Main Features of Marine Accidents
2. Classification of Marine Casualties
3. Analysis of Ships Total Loss from 1981-1985 by Accident Categories
4. Sources of Casualties Reports and Information

Chapter II: Types of Marine Casualty Investigation and Their Reports

1. Authority and Powers
2. Qualities of Marine Investigator
3. The duties of Investigator
4. Preliminary Inquiries
5. The Report
6. Narrative Report
7. The Recommendation
8. Formal Investigation
9. The International Obligations and Technical Reports to IMO.
### Chapter III: The Main Points, Guidelines With Checklist for Marine Casualty Investigation

1. Collision  
2. General Checklist  
3. Checklist in Case of Collision  
4. Grounding  
5. Checklist in Case of Grounding  

### Chapter IV: The Inquiry and Investigation System in Egypt

1. Introduction  
2. The Laws and Rules Enacted by the Egyptian Legislator.  
   - The Maritime Surveyors  
   - Exofficio Experts  
   - Experts of Ministry of Justice  
   - Independent Surveyors  

### Chapter V: The Authorities Responsible for Analysis of The Maritime Accident in Egypt

First: Port and Light Houses Administration  
Second: Suez Canal Authority  
Maritime Accidents in the Canals  
The Research Center of Suez Canal Authority
Chapter VI: Aspects of Points of Weakness of the Inquiry and Investigation System in Egypt

1. The Public Division for Legal Affairs
2. Department of Maritime and Ship Wreckage
3. Maritime Legislation and Investigation Department (Maritime Inspection Administration)
4. Types of Maritime Accidents and Casualties
5. Serious Maritime Casualties in Egypt (Accident of M/V GARNET/MOLANVENTURE)
6. Marine Casualties in Egypt
   - Accident of M/V SLAH-EL-DEIN
   - Grounding Accident of M/V SAKRA
7. Light Marine Accidents in Egypt
8. Determination of Points of Weakness

Chapter VII: The Role of Maritime Academy (AMTA)

First: A Draft Proposal for Marine Casualty Investigation Course

Introduction

1. Study's Objective
2. Qualification and Background of the Student
3. Course duration 168
4. Facilities 168
5. Teaching Aids 168
6. Field Visits. 169

Course Contents and Outline of Sub-courses.

CI.1 Safety on Board Ships 175
CI.2 Tanker Safety & Oil Pollution 181
CI.3 Cargo Securing 186
CI.4 Dangerous Cargoes 189
CI.5 Ship Stability & Structure Stresses 199
CI.6 Supplement 202
CI.7 Procedure & Process of Marine Casualty Investigation, and Preparation of Technical and Legal Report. 203

Second: A New Role for The Maritime Research and Consultancy Center. (MRCC) - (AMTA) 212

Chapter VIII: Summary and Conclusion with Recommendations 218

Annexes: 1. Format of Marine Casualty Reports (IMO) 225
2. Inspection Record of Suez Canal Casualties 231

Bibliography 240
Reference 244
To the person,
Who raised the slogan of justice and righteousness
for forty years,
Who enlightened many aspects of my life,
Who led my steps into law.
To my brother,
Counsellor
ABDEL MONEM EL SHWARBY
(1923-1985)
President of the Supreme Court.
Cairo-EGYPT
The study at the World Maritime University (WMU) has given me the opportunity to undertake this thesis on "Marine Casualty Investigation and in This Connection the Role of Maritime Academy".

Before proceeding with this thesis I discussed its subject with my professor in World Maritime University, Mr. Gunther Zada, the Vice Rector of WMU, who gave me some valuable advices.

I chose this research based on my practical background which exceeds twenty years in the maritime field. During this period I have served as deck officer, master on board different types of ships, traffic officer at the shore side, and Assistant of Alexandria Harbour Master. In 1978, I finally joined the Arab Maritime Transport Academy (AMTA) as a Lecturer in Nautical Department, while at the same time I attended an evening course and got a higher diploma in Maritime Transport (AMTA - 1980).

During this period of twenty years maritime experience, I participated in many inquiries and marine accident investigations, specially during the my work in Alexandria Port. What I have concluded after this period of working experience is the vital need for the marine experts and marine investigators, who are well aware of the scientific and practical basis of investigation and analyzing the marine accidents. To achieve this goal, it is indisputably necessary to establish a new course in AMTA for the marine investigators and surveyors in the nearest future.

At this point I desire to express my warm thanks to Professor P.S. Vanchiswar who helped me by giving me most valuable advices.
I also wish specifically to record the encouragement given me by Alexandria Maritime Transport Academy, which gave me the opportunity to participate in this course and provided me with all the facilities which I needed.

My special thanks to Mr. Richard Poisson, the Librarian at the WMU who continuously supplied me with informative books and data concerning some parts of my thesis.

El Shwarby M. Talal
ABSTRACT

Every year a large number of maritime accidents occurs, some of these accidents resulting in heavy loss of life, vast pollution of the sea and enormous loss of property.

The best way to alleviate this situation is to institute a thorough investigation into the causes of each accident, the important purpose of marine casualty investigation being to obtain information for the prevention of similar casualties. As far as practicable, it is necessary that the causes of the casualty be determined as precisely as possible in order that detailed factual information will be available for review and statistical studies. It is not sufficient to know only how a casualty occurred, it must also be clear why it happened.

Based on this information, appropriate corrective measures, regulations, qualification and standard of crew education, and standards of safety may be developed and instituted or legislation for marine safety may be recommended if needed.

However, it is important to the maritime countries to establish the necessary infrastructure to conduct inquiries and meet the national and international obligations concerning the marine casualty investigation. The success of the investigation and analysis system depends on the efficiency of the marine personnel (investigators and marine experts) dealing with marine casualties.
Solution:

The Maritime Academies have a great role to play in this subject by providing a specialized course concerning marine casualty investigation and its analysis.

In our research we shall deal with the following:

a. Necessity of making analysis of marine casualties, the authorities which are responsible for performing the analysis, and the ideal method by which the procedures of the inquiry and analysis are performed.

b. A comprehensive study about the administration authorities who are responsible for analysing maritime accidents in Egypt, the marine surveyors, inspectors and the laws which are enforced in these topics.

c. Clarifying the new role of the Maritime Academy concerning maritime accidents by:

- Presenting a proposal for Marine Casualty Investigation Courses, including the details of the syllabus.

- A new role for a Research Center in the Arab Maritime Transport Academy (Egypt).
MARINE CASUALTY INVESTIGATION AND

IN THIS CONNECTION THE ROLE OF MARITIME ACADEMY

GENERAL

(NATIONAL)

Chapter

(I)

Types of Marine Casualties.
Analysis of Ships Total Loss from

(II)

Types of Marine Casualty Investigation and Their Reports.

(III)

The Main Points, Guidelines With Checklist for Marine Casualty Investigation

(IV)

(V)

(VI)

(VII)

The Role Of Maritime Academy (AMTA).
A Draft Proposal for Marine Casualty Investigation Course.

(VIII)

The Inquiry and Investigation System In Egypt

The Authorities Responsible for Analysis of Maritime Accident In Egypt.

Aspects of Points Of Weakness of the Inquiry and Investigation System In Egypt.

A New Role For The Maritime Research and Consultancy Center, (MRCC)-(AMTA)

Summary and Conclusion With Recommendations
INTRODUCTION

1. Maritime transport is considered as the spinal column of the international trade and the flowage of movement of the goods from a place to another depends upon the available means of transportation, extent of its safety, and guarantee of its arrival. So the more the means of transportation is safe and easy and its cost is low, the more the movement of international trade and what follows it from the international economic boost is increased.

2. The world merchant fleet is the easiest means of transport, with lowest cost. The industry of marine transport and ship design are developed, ships now-a-days are equipped with modern, sophisticated navigational and safety equipment so as to:

   a. Gain advantage from the expanded transport. Economies of scale.

   b. Reduce the cost.

   c. Increase the elements of safety during the maritime journey.

3. Inspite of all that the threats to which the ship is subjected in the maritime journey represent a serious danger against arrival of the ship and commodity to the port of arrival. This leads to increasing of costs of insurance premiums on both the ship and the commodity. Further the ship insurance
premiums have been considerably increased during the previous periods because of the increase in prices of building the ships, so if the insurance is increased, the cost of transportation would also be increased.

4. In order to increase the elements of safety in the ship's journey it is necessary to:-

a. Develop the ship building industries with the means to achieve the increase of the safety elements in both ship's body (hull) and machines (engines).

b. Supply the ships with equipment which guarantee safety of the maritime trip (safety, navigational, and other necessary equipments).

c. Increase capability of the laborers on ships by educating and training them with the methods of using the equipment which exist on the ships.

d. Derive an advantage from the maritime accidents which occur in the ships by finding out the reasons, motives, and the technical mistakes which led to them.

5. Every year maritime accidents occur in ships, and these accidents lead to the following:-

a. Loss of human life and health.

b. Environmental damage.

c. Economic loss.

So the specialized establishments in the state and field in which the accident occurs will be sought in order to perform
an investigation and analysis so as to know the following:

1. The manner by which the accident occurred.
2. Reasons of the accident.
3. Probable technical mistakes.
4. The person responsible for the technical failure.
5. Applying the law on the guilty parties.
6. Issuance of recommendations which guarantee the following:-

6.1 Utilizing reasons of the accident so as to prevent its repetition.

6.2 Issuance of directions and preparation of the laws and regulations which guarantee prevention of occurrence of this accident, or at least reduction of the probability of its occurrence.

6.3 Invention of the apparatuses which promote the effectiveness and safety of the maritime navigation.

6. The international organizations which are connected with the maritime field (e.g. ILO, ITU, WMO), and above all, the International Maritime Organization, establish general regulations, and convoke the international conferences and the international maritime conventions which guarantee reduction or prevention of the accidents by attempting to eliminate their causes.
7. It has been stated in the consecutive international marine conventions that in case of occurrence of any maritime casualty in the territorial waters, a complete report and analysis about the accident should be made and the International Maritime Organization must be informed of it so as to utilize the experienced gained concerning the accident.

It should also be mentioned that the SOLAS Convention, 1974 and its 1978 Protocol, and amendments are the most important of these conventions.

8. The ships are subject to many kinds of maritime casualties, yet the most common of them are stranding and collision. The reason for these two kinds of casualties is because of the intensity of movement of ships in the following areas:

- Approaching the coast under narrow navigational regions.
- Navigational straits.

The seriousness of the above mentioned casualties is considerably increased in the case of passing through the navigational canals such as Suez Canal, Panama Canal and Kiel Canal.

Analysis of the maritime accidents which occur in these canals is an essential matter with a view to find out the actual reasons for these accidents and their results. Once this step is taken, then the authorities
of the canal apply the necessary procedure to eliminate the reasons which lead to repetition of such accidents. This will increase the degree of safety and security of the ships on the passage and guarantees the continuation of their passing.

Furthermore, the Suez Canal in Egypt is considered as the most important maritime passage in the world through which about 22000 ships pass annually. Among these ships are also VLCC and ULCC any of which amounts to 450 thousand tons (on ballast) and this necessitates performing the accurate maintenance in their passage. Moreover, the accidents which occur in navigational canals are in general due to the following reasons:-

a. Lack of navigational aids.

b. Inconsistency of form of the Canal's bottom with the draft of the ships which pass through and this tends to make the ship deviate from its route.

c. Technical factors or other outside factors.

Consequently, it was necessary to perform a complete analysis about all kinds of accidents with a view to understanding the actual reasons of the accident.

9. In our research we shall deal with the following:-

a. Necessity of making analysis of the maritime casualties, the authorities who are responsible for performing the analysis, and the ideal method by which
the procedures of the inquiry and analysis is performed.

b. A comprehensive study about administration authorities who are responsible for analysing the maritime casualties in Egypt, the marine surveyors, inspectors and the laws which are enforced in this topic.

c. Throwing light on points of weakness in the current system and presenting proposals which concern promotion of capabilities of those who analyse the maritime accidents.

d. Clarifying the role of the Arab Maritime Transport Academy as to maritime accidents.
   - Present a proposal for marine casualty investigation through courses including the details of syllabus.
   - A new role for a research center in the Arab Maritime Transport Academy.
CHAPTER I

TYPES OF MARINE CASUALTIES
1. The Main Feature of Marine Accidents:

The main three elements participating in the marine voyage are ship, cargo, and men (human lives: crew and passengers). These three elements are normally at risk and any damage or tort and delict can be considered as a marine accident. The ship itself becomes liable to risks as soon as it starts to be built in the shipyard.

The "USCG M.S.M." Volume 5, concerning the investigations of marine casualties, has defined the marine accident as:

"The marine casualty or accident which involves any of the following:

1.1 All accidental groundings and any intentional grounding which also meets any of the other reporting criteria or creates a hazard to navigation, the environment, or the safety of the vessel.

1.2 Loss of main propulsion or primary steering or any associated component or control system, the loss of which causes a reduction of the maneuvering capabilities of the vessel, loss means that systems, component parts sub-systems, or control systems do not perform the specified or required function.

1.3 An occurrence materially and adversely affecting the vessel's seaworthiness or fitness for service or rote, including but not limited to fire, flooding, or failure or damage to fixed fire extinguishing systems, lifesaving equipment, auxiliary power generating equipment, or bilge pumping systems.

1.4 Loss of life.

1.5 Injury causing a person to remain incapacitated for a period in
excess of 72 hours.

1.6 An occurrence not meeting the above criteria but resulting in damage to property exceeding 25,000 U.S. dollars. Such damage includes the cost necessary to restore the property to the service condition which existed prior to the casualty, including the cost of salvage, gasfreeing, and drydocking. It does not include such items as demurrage."

The above definition description for the marine accident or casualty, is commonly used by most of the national maritime legislations in different countries, but it can only be different in the total amount of the accident expenses which according to the USA regulations is 25,000 dollars, and also the incapacity which in some of the countries is limited to 48 hours.

It is necessary that the accident will be defined in the national maritime laws or regulations in order to provide the investigation authority with a clear jurisdiction in proportion between, among other things, the safety authorities.

The most common types of accidents can be classified as follows:-

a. Loss of lives (killed or badly hurt)
b. Sinking
c. Capsize
d. Collision
e. Fire
f. Explosion
g. Grounding
h. Structural failure
2. **Classification of Marine Casualty or Accident:**

Certain marine casualties have been classified to facilitate advance reporting to the authorities responsible for marine casualties, they are as follows:

2.1 **Major Marine Casualty:**

   2.1.1 Loss of six or more lives.

   2.1.2 Caused serious threat to the marine environment.

   2.1.3 Loss of a mechanically propelled vessel of 100 or more GT.

   2.1.4 Property damage initially estimated high costs. According to the USA law, and USCG regulations it applies to the damages which cost more than 500,000 U.S. dollars.

2.2 **Serious Casualty:**

The IMO has defined a "serious casualty" as any occurrence involving vessels of 1600 GT or more which results in total loss (including constructive total loss) of one or more vessels or loss of lives.

2.3 **Significant Marine Casualty:**

The significant marine casualties are occurrences resulting as:

   2.3.1 Multiple loss of life resulting from a vessel casualty.

   2.3.2 Single loss of life resulting from a vessel casualty caused by unusual or extraordinary circumstances.
2.3.3 A marine casualty likely to receive national press attention.

2.3.4 A threat or potential threat of hazard to life, property, or the environment resulting from a vessel casualty.

2.3.5 Loss of inspected vessel.

A significant marine casualty may also be determined to be a major marine casualty at later time.

Returning to the three main elements participating in the marine voyage (ship, cargo, and human lives) we find that most of the accidents are related to them. There is also another main factor which causes damage to the ship, i.e. the environment or the weather, both sea and wind. So, the main factors which play an important role in a marine casualty/accident are:

a. Crew (Human factors)
b. The ship
c. The cargo
d. The weather

The following definitions are used in the ships and tankers casualty scheme, "IMO Casualty Statistics MSC 50/13".

**Total Loss:**

The term "total loss" refers to a tanker or ship which, as a direct result of being in a marine casualty, has ceased to exist, either by virtue of the fact that the ship is irrecoverable, or has subsequently been scrapped as a consequence of the casualty.
Serious Casualties:

The information provided by Lloyds Register on each casualty involving a tanker or ship "at risk" has been assessed as "serious" or otherwise on the following basis:

Serious casualties include reports of:-

1. A fire, explosion, collision, grounding, contact, heavy weather, damage, ice damage, hull cracking or suspected hull defect resulting in structural damage rendering ship under water, immobilization of main engines, extensive accommodation damage, loss of life, and/or pollution.

2. A "breakdown" necessitating towage or shore assistance.

3. A "total loss", as defined above.
Categories of Casualty Used:

1. **Founded:**
   Includes ships which sink as a result of heavy weather, springing of leaks, breaking in two, etc. and not as a consequence of categories 2-9.

2. **Wrecked/Stranded:**
   Includes ships reported hard and fast for an appreciable period of time and cases reported touching sea bottom. This category includes entanglement on under-water wrecks, grounding and bumping over bars, etc.

3. **Contact:**
   Striking an external substance but not another ship or the sea bottom. This category includes striking drilling rigs/platforms, regardless of whether in fixed position or in tow.

4. **Collision:**
   Striking or being struck by another ship, regardless of whether under way, anchored or moored. This category does not include striking under-water wrecks.

5. **Fire and Explosion:**
   Where the fire and/or explosion in the first incident report is noted, it therefore follows those casualties involving fires and/or explosions after collisions, strandings, etc. and would be categorized under "Collision/Stranding". Scavenge fires will also be included in this category.
6. Missing:

After a reasonable period of time no news having been received of a ship and its fate being therefore undetermined, the ship is posted as "missing" at the corporation of Lloyds and is included in the missing category on the data base together with similar cases reported by the other reliable sources. In peacetime, missing ships are considered as losses by marine perils.

7. Hull/Machinery Damage:

It includes ships lost or damaged as a result of hull/machinery damage or failure which is not attributable to categories 1-7 or category 9.

9. Miscellaneous:

Includes ships which have been lost or damaged and for the lack of sufficient information or other reasons, cannot be classified.

10. Exclusions:

The following have not been included:

10.1 Naval tankers and ships, non-self-propelled tank barges and tank cleaning vessels, wine tankers.

10.2 Non tankers carrying hazardous cargoes.

10.3 Tanker casualties occurring before delivery or after sail for breaking up.

10.4 Consequences of hostilities.

10.5 Groundings requiring lightening and/or tugs, but no damage or pollution reported.
10.6 Loss of life or pollution not a consequence of tanker casualty (e.g. operational pollution not included).

10.7 Casualties involving serious damage or loss of life on, and/or pollution from another vessel or jetty without "serious" consequences to a tanker.
3. Analysis of the Ships' Total Loss from 1981 to 1985 by Accident Categories

3.1. General:

The central analysis, presented hereby, is for the total loss of ships of 500 GRT and above, during the last five years (1981-85), which is based on the Lloyd's Statistical Reports and on an evaluation of other reliable international statistics and contributions to this subject.

In general, marine casualties occur because of human failures, negligence, carelessness, and inaccuracy; particularly the collisions and stranding. On the other hand, failures might as well be caused by malfunctioning of equipment. Sometimes a lack of safety might be due to lack of information, experience, bad manning or bad management.

However, during the last five years, the world merchant fleet has lost 1095 ships of 500 GRT and above from different types of total tonnage more than 70 009 000 GRT as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Total Tonnage (GRT)</th>
<th>Percentage of Total Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of Ships (%)</td>
</tr>
<tr>
<td>Tankers</td>
<td>108</td>
<td>21 919 000</td>
<td>9.85</td>
</tr>
<tr>
<td>Bulk &amp; Combined Carriers</td>
<td>105</td>
<td>18 182 000</td>
<td>9.58</td>
</tr>
<tr>
<td>Other types</td>
<td>883</td>
<td>29 908 000</td>
<td>80.57</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1096</td>
<td>70 009 000</td>
<td>100.00</td>
</tr>
</tbody>
</table>
REPORTED TOTAL LOSSES BY NATURE OF CASUALTY DURING 1981/85 (AVERAGE)

- OTHERS
- WEATHER
- MISSING
- FOUNDING
- CONTACT
- COLLISIONS
- STRANDING
- MACHINERY
- FIRES

SHARE OF GRT / SHIPS 500 GRT/OVER
## Reported World Total Losses by Nature of Casualty During 1981 - 1985

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather</td>
<td>50 393.3</td>
<td>40 247.2</td>
<td>43 178.0</td>
<td>53 244.7</td>
<td>34 128.0</td>
<td>44.0</td>
<td>238.2</td>
</tr>
<tr>
<td>Founderings and Abandonments</td>
<td>24 92.1</td>
<td>22 60.8</td>
<td>29 100.2</td>
<td>32 104.2</td>
<td>35 156.1</td>
<td>28.4</td>
<td>102.7</td>
</tr>
<tr>
<td>Strandings</td>
<td>38 178.2</td>
<td>40 177.4</td>
<td>34 294.3</td>
<td>37 290.3</td>
<td>37 314.0</td>
<td>37.2</td>
<td>250.8</td>
</tr>
<tr>
<td>Collisions</td>
<td>30 144.7</td>
<td>20 59.4</td>
<td>11 36.8</td>
<td>12 62.0</td>
<td>13 120.9</td>
<td>17.2</td>
<td>84.8</td>
</tr>
<tr>
<td>Contacts</td>
<td>11 33.3</td>
<td>7 25.0</td>
<td>7 29.3</td>
<td>7 38.2</td>
<td>2 4.9</td>
<td>6.8</td>
<td>26.2</td>
</tr>
<tr>
<td>Fires and Explosions</td>
<td>69 673.7</td>
<td>72 672.3</td>
<td>66 637.3</td>
<td>56 396.9</td>
<td>50 423.7</td>
<td>62.6</td>
<td>560.8</td>
</tr>
<tr>
<td>Missing</td>
<td>5 10.2</td>
<td>1 19.5</td>
<td>-</td>
<td>-</td>
<td>2 16.3</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Machinery, Shafts and Props.</td>
<td>5 39.7</td>
<td>8 67.1</td>
<td>1 12.9</td>
<td>8 118.6</td>
<td>7 69.8</td>
<td>5.8</td>
<td>61.6</td>
</tr>
<tr>
<td>Other casualties</td>
<td>16 49.0</td>
<td>26 131.5</td>
<td>18 62.3</td>
<td>7 11.8</td>
<td>10 46.1</td>
<td>15.4</td>
<td>60.1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>248 1614.2</strong></td>
<td><strong>236 1460.2</strong></td>
<td><strong>209 1351.5</strong></td>
<td><strong>214 1283.0</strong></td>
<td><strong>189 1291.9</strong></td>
<td><strong>219.2</strong></td>
<td><strong>1400.2</strong></td>
</tr>
</tbody>
</table>

| World tonnage            | 411635.2               | 415336.6              | 413050.4              | 409176.2               | 406697.6              | 411179.2       |                                  |
| Loss ratio %             | 0.39                   | 0.35                  | 0.33                  | 0.31                   | 0.32                  | 0.34           |                                  |
Note: All the loss figures shown in the tables are those which have been posted in the Loss Book of the Institute of London Underwriters in 1985. They refer to vessels of 500 gross tons and over and include Constructive Total losses. The figures for world tonnage have been extracted from the Statistical Tables published by Lloyd's Register of Shipping.

REPORTED WORLD TOTAL LOSSES BY
NATURE OF CASUALTY

YEAR

1981 / 1985 (EL7)

REPORTED WORLD TOTAL LOSSES BY
NATURE OF CASUALTY 1981/ 1985

YEAR

SHIPS OF 500 GRT AND OVER
3.2 Weather Damage:

The total number of ships lost during 1981 to 1985 by bad weather was 220 ships of different types, representing 20.07% of the total number and 17% of total tonnage lost during this period. The effect of the bad weather was often the direct cause for shifting of cargo inside ships' holds which caused unbalance leading to the foundering. The annual average losses by number and tonnage remained constant, 44 ships of total tonnage 2,282,000 GRT.

3.3 Ships Foundered:

The sudden foundering which has been caused by the unbalance due to bad weather, bad stability and cargo shifting is the most common cause of foundering. Also the weakness of ships' hulls or being unable to face the driving waves that may cause structural failure as occurred to the oil tanker of 276,000 ton (VLCC) in the end of the 60s, or by opening the ramps of RO/RO and container ships. It is most difficult to know the real reason for such casualties due to shortage of time between the beginning of the accident and complete foundering of the ship, and also lack of information about the accident given by the crew before foundering.

However, during the last five years the number of ships totally lost was 142 of total tonnage 513,500 GRT, representing 12.9% of total casualties, and 16.9% of total tonnage lost.

3.4 Collisions:

Collisions are most unlikely to occur in the open seas but often in the congested areas, marine passages and narrow places, bad and limited
visibility besides high speed, inaccurate information taken from the radar and carelessness in applying the rules of preventing collision at sea, were the major reasons of collisions.

In a study by D. Rother "Ship Casualties - An Analysis of Causes and Circumstances" the possibility of collisions to occur under fog conditions is three times as high as under normal visibility conditions, and when visibility becomes nearly thick fog, the possibility for occurrence of collision is six times as high as normal.

In a report submitted to IMO, Sub-Committee on Safety of Navigation, 26th Session on 15th September 1981, concerning "Collision Statistics and Analysis of Causes of Collisions, NAV 26/4/1", the statistics have stated that the areas of high numbers of collisions during the period from 1958 to 1980 were as follows:

<table>
<thead>
<tr>
<th>Region</th>
<th>Total Number of Collision (1958-80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coasts of Japan and Korea</td>
<td>436</td>
</tr>
<tr>
<td>Southern of North Sea</td>
<td>287</td>
</tr>
<tr>
<td>Dover Strait</td>
<td>209</td>
</tr>
<tr>
<td>Baltic Sea</td>
<td>172</td>
</tr>
</tbody>
</table>

There has been a considerable decrease in the number of collisions occurring off north west Europe and Dover Strait in recent years. The main reasons for that was the traffic separation scheme besides the (VTS) vessels traffic system used in this area.
Indeed, a considerable change has taken place during the last thirty years, size and speed of ships as well as traffic density increased so much that the expectation of a tendency towards greater risks of collision seems justified.

However, the number of ships totally lost because of collision during the past five years was 86 ships representing 7.8% of total casualties. The total tonnage of these ships was 424,000 ton (GRT) which represented 6.1% of total tonnage lost.

3.5. Machinery and Shafts Casualties:

This sort summed up to 2.6% of all casualties. The total number of ships lost during the last five years was 29 ships, with total tonnage of 308,000 ton (GRT).

The damage to the main engine can be classified as following:

3.5.1 Damages which cause a total breakdown of the engine and cannot be repaired by own means.

3.5.2 Damages which after extensive repair by own means allow to go on with reduced power.

3.5.3 Damages which after repairs by own means allow to go on with normal service.

In fact the most serious case is the first one specially in the bad weather which can lead the ship to real distress, the following items to be taken into consideration:
a. Number of engine room crew.
b. The age of the engine (ship).
c. Type of ship.
d. The route on which the ship serves.
e. The frequency of its working on full capacity.
f. The type of propulsion.
g. The quality of lubricating oil and bunkers.
h. The degree of automation.
i. Quality of the engineers and watchkeepers, which is still important for the reliability of the ship's main engine.

3.6 Stranding:

The main risk at sea today arises from strandings, the number of groundings by merchant ships every year is considerable, compared with the professionalism which today's shipping can be effected. In fact, from different statistics concerning analysis of grounding cases, we know that about three quarters of all groundings are caused by human error, wrong behaviour extending mainly to negligence, mal-operation and faulty decisions. Also there are some additional factors which can be apart from causes like bad weather or machinery damage; groundings are most likely to occur if the watchkeeping officers do not have complete information about their ships' routes and/or wrongly use their navigational equipment.

However, in the last five years, groundings amounted to 16.9% of all casualties; the world merchant fleet has lost 186 ships with total tonnage amounting to 1,254,000 ton (GRT), summed up to 17.9% of all tonnage lost.
REPORTED WORLD TOTAL LOSSES BY FLAG (1981 - 1985)

<table>
<thead>
<tr>
<th>No.</th>
<th>Flag</th>
<th>1981 No.</th>
<th>grt/gt</th>
<th>1982 No.</th>
<th>grt/gt</th>
<th>1983 No.</th>
<th>grt/gt</th>
<th>1984 No.</th>
<th>grt/gt</th>
<th>1985 No.</th>
<th>grt/gt</th>
<th>grt/gt % share **</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Panama</td>
<td>50</td>
<td>227.9</td>
<td>58</td>
<td>322.3</td>
<td>56</td>
<td>312.0</td>
<td>48</td>
<td>284.8</td>
<td>42</td>
<td>333.7</td>
<td>25.8</td>
</tr>
<tr>
<td>2</td>
<td>Greece</td>
<td>63</td>
<td>579.0</td>
<td>43</td>
<td>343.6</td>
<td>37</td>
<td>329.4</td>
<td>30</td>
<td>349.6</td>
<td>12</td>
<td>187.5</td>
<td>14.5</td>
</tr>
<tr>
<td>3</td>
<td>Mexico</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>32.0</td>
<td>5</td>
<td>7.7</td>
<td>2</td>
<td>8.0</td>
<td>6</td>
<td>174.4</td>
<td>13.5</td>
</tr>
<tr>
<td>4</td>
<td>Liberia</td>
<td>9</td>
<td>99.4</td>
<td>6</td>
<td>139.7</td>
<td>7</td>
<td>182.6</td>
<td>9</td>
<td>186.8</td>
<td>8</td>
<td>155.1</td>
<td>12.0</td>
</tr>
<tr>
<td>5</td>
<td>Korea (South)</td>
<td>13</td>
<td>38.2</td>
<td>6</td>
<td>15.4</td>
<td>13</td>
<td>45.8</td>
<td>9</td>
<td>22.4</td>
<td>15</td>
<td>86.6</td>
<td>6.7</td>
</tr>
<tr>
<td>6</td>
<td>India</td>
<td>2</td>
<td>18.2</td>
<td>1</td>
<td>12.5</td>
<td>1</td>
<td>2.9</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>54.8</td>
<td>4.2</td>
</tr>
<tr>
<td>7</td>
<td>Cyprus</td>
<td>11</td>
<td>27.3</td>
<td>16</td>
<td>76.8</td>
<td>5</td>
<td>21.9</td>
<td>10</td>
<td>42.3</td>
<td>11</td>
<td>42.3</td>
<td>3.3</td>
</tr>
<tr>
<td>8</td>
<td>UK</td>
<td>4</td>
<td>3.9</td>
<td>4</td>
<td>10.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>29.3</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>152</td>
<td>993.9</td>
<td>136</td>
<td>952.4</td>
<td>124</td>
<td>902.8</td>
<td>108</td>
<td>894.8</td>
<td>105</td>
<td>1063.7</td>
<td>82.3</td>
</tr>
<tr>
<td>9</td>
<td>Other Flags</td>
<td>96</td>
<td>620.3</td>
<td>100</td>
<td>507.8</td>
<td>85</td>
<td>449.2</td>
<td>106</td>
<td>388.2</td>
<td>79</td>
<td>228.2</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>GRAND TOTAL</td>
<td>248</td>
<td>1614.2</td>
<td>236</td>
<td>1460.2</td>
<td>209</td>
<td>1351.5</td>
<td>214</td>
<td>1283.0</td>
<td>189</td>
<td>1291.9</td>
<td>100.0</td>
</tr>
</tbody>
</table>

* grt/gt by thousand ton.

** Share of tonnage total losses in 1985.

Source: Sources of data shipping statistics "Institute of Shipping Economics" Bremen Casualty Returns pp 20, 21 May 1986, own calculation.
TOTAL WORLD MERCHANT FLEET BY FLAGS

AS OF JULY 1ST 1985

Vessels of 300 ton and over.

<table>
<thead>
<tr>
<th>No.</th>
<th>Flag</th>
<th>No. of Ships</th>
<th>dwt (1000)</th>
<th>Share of Flag (dwt - %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Panama</td>
<td>3 829</td>
<td>60 656.5</td>
<td>9.71</td>
</tr>
<tr>
<td>2</td>
<td>Greece</td>
<td>1 920</td>
<td>50 686.5</td>
<td>8.09</td>
</tr>
<tr>
<td>3</td>
<td>Mexico</td>
<td>101</td>
<td>1 864.8</td>
<td>0.30</td>
</tr>
<tr>
<td>4</td>
<td>Liberia</td>
<td>1 664</td>
<td>107 778.5</td>
<td>17.25</td>
</tr>
<tr>
<td>5</td>
<td>South Koria</td>
<td>665</td>
<td>10 345.2</td>
<td>1.66</td>
</tr>
<tr>
<td>6</td>
<td>India</td>
<td>425</td>
<td>10 294.7</td>
<td>1.65</td>
</tr>
<tr>
<td>7</td>
<td>Cyprus</td>
<td>748</td>
<td>11 819.8</td>
<td>1.89</td>
</tr>
<tr>
<td>8</td>
<td>UK</td>
<td>915</td>
<td>20 794.0</td>
<td>3.33</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>10 267</td>
<td>274 240.3</td>
<td>43.88</td>
</tr>
<tr>
<td>9</td>
<td>Other Flags</td>
<td>23 522</td>
<td>350 742.9</td>
<td>56.12</td>
</tr>
<tr>
<td></td>
<td>Grand Total</td>
<td>33 789</td>
<td>624 983.2</td>
<td>100.00</td>
</tr>
</tbody>
</table>


Compiled by author.
TOTAL WORLD MERCHANT FLEET BY FLAGS
AS OF JULY 1ST 1985

SHARE OF FLAG (DWT-%) SHIPS 300G&OVER

REPORTED WORLD TOTAL LOSSES BY FLAG
SHARE OF TONNAGE TOTAL LOSSES 1985

( GRT % SHARE )  EL12
Serious Casualties to Oil/Chemical Tankers, (1970 / 1984)

Lives lost due to Serious Casualties to Oil/Chemical Tankers

Source of data: IMO, MSC 52/17, Annex 3
Serious Casualties to Oil/Chemical Tankers, (1970 / 1984)

Du to Fire & Explosion (E115)

Lives lost due to Serious Casualties to Oil/Chemical Tankers

Du to Fire & Explosion (E116)

* Combination carriers, and gas carrier included.

** The total number of life lost 999, 253 occurred when ship was under repair.

*** Source: IMO, MSC 52/17, annex 3.
3.7. Fire and Explosion:

During the last five years (1981-85), 313 ships with the tonnage of 2,804,000 GRT were totally lost by fire and explosions, which makes 28.6% of total casualties and 40.1% of total tonnage lost.

Fire and explosions on ships involve greater risks to life and property than other accidents.

The fires and explosions may occur in engine room, accommodation, and cargo spaces. Fires are mainly caused by the following:

3.7.1 Careless handling of open fire.

3.7.2 Ignition of cargoes or gases released from cargoes.

3.7.3 Electrical short-circuits.

3.7.4 Ignition of oil dust on the machinery surfaces.

Fires can occur when the ship is in the open sea or during loading and discharging of cargo inside ports or when the ship is under repair. In fact, we can demonstrate that two factors are mostly responsible for the increasing number of fires on board ships:

a. The fact that the human element brings some incalculable factors into the technical system.

b. The fact that the transport of hazardous cargoes under financial and technical constraints is not always done in the way it should be.
The Maritime Safety Committee at IMO presents an annual report concerning the analysis of serious casualties to oil/chemical tankers and combination carriers of 6000 GRT and above. In the last report, MSC 52/17, concerning serious casualties to oil/chemical tankers 1970-1984, the total number of serious casualties caused by fire and explosion during this period was 308 accidents, 41% happening in cargo holds, 44.4% in engine rooms and 14% in other processes. The cause of these accidents was mostly due to the human factor in negligence in taking necessary precautions and emergency procedures against fire risks according to the safety rules indicated in the International Conventions concerning Safety at Sea.

Conclusion:--

We have reviewed the marine accident statistics, which reflect the number of ships totally lost during the last five years. There are a lot of studies analyzing the causes and result of marine casualties, but we aimed to make a quick and summarized presentation to show the value of ships lost, and compared a loss rate in tonnage to the total number of ships of the world fleet. It is noticed that fire and explosion accidents had a high rate, followed by grounding and bad weather damages. The reasons for 80% of these accidents was the human factor, which can be reduced by increasing the level of education and training of ships' crews. The STCW Convention has represented the spinal column of developing training and teaching ships' crews.
4. Sources of Casualties Reports and Information

There are three primary sources of casualty information available to research workers in most countries. First is the information from the international marine organizations, Liverpool underwriter's casualty returns, and particularly the Lloyds Register of Shipping (London). Lloyds collects details of the position of casualty, types of ships involved and primary causes. This information is stored in Lloyds computers and it includes total losses as well as ships which have been seriously damaged. Information relating to total losses are published each quarter in Lloyds casualty returns. Information on ships which are damaged but not lost can be obtained from Lloyds in the form of computer print-out on payment of a fee. The type of information contained in these records are as follows: Ship's name and year built, gross tonnage, flag, type of ship, origin and destination, cargo carried and circumstances and place.

The second source of information is the International Chamber of shipping "Navigation Casualty Report Scheme". This is provided primarily for ship owners and government use, not every casualty is detailed in the reports but what is provided is extremely useful and takes the form of an analysis, accompanied by short extraction of the incidents and the navigational errors. The third source is that of the Official Government Records of the flag state. These are normally confidential as they represent the surveyor's report to government following an inquiry into the casualty. These reports are quite comprehensive and provide information on the type of accident, the environment of the area of occurrence and details of the ship and the cross examination of the master and the officers during the inquiry.
CHAPTER II

TYPES OF MARINE CASUALTY INVESTIGATION
AND THEIR REPORTS
General:

The primary purpose of investigation is to ascertain cause(s) and to determine what corrective measures, if any, should be taken. The Safety Administration (S.A.) investigation also ascertains if there are any violations of the national legislation "merchant shipping act", or the regulations. The S.A. can assess civil penalties but if there is evidence of criminal violations on the part of any person, the case should be referred to the court (Municipal Legal Systems). The S.A. is not to investigate to fix civil liability between private litigants, instead the investigations are means to promote safety of life and property and to protect the environment.

1. Authority and Powers:

As a state has sovereignty over its own territories only, the legislation of a country is also primarily territorial. This leads to the general rule that the laws of a nation apply to all things and acts within its territories including its waters and ships of its flag on high seas and foreign private ships within its territorial waters. This confers jurisdiction on municipal courts of the coastal state even in relation to the ships flying foreign flags when in national or territorial waters. This means that any casualty occurring to a coastal state registered vessel anywhere is potentially a matter for exercise of the boards investigatory powers. Similarly, these powers may be invoked in the case of a casualty involving a foreign vessel, if the casualty has occurred within the jurisdiction of the coastal state.

In fact the jurisdiction of the investigator does not extend beyond the limits of the jurisdiction of the S.A., as provided by the laws it
administers and enforces, therefore, an investigator must confine his activities within the limits of his authority.

It is, however, important to cooperate with other investigative agencies of the government, and with the investigating officials of state and local authorities. As an example, in case of death arising from a marine casualty, the state having criminal jurisdiction may desire to proceed in a negligent homicide case against the vessel(s) pilot or master. In this case, the state's attorney should be informed of the remedial limitations of any S.A. action and the state should be offered the full cooperation of the S.A. in the investigation.
Qualifications of a Marine Investigator:

The marine casualty is an accident related to the use or operation of a ship and resulting damage to or incapacitation of the ship, its machinery or equipment or resulting damage to other properties.

The causes of marine accidents are different and sometimes one factor or more cause the damage to the ship or the cargo on board or even cause loss of lives.

The investigation applies to any search for the facts and their analysis to whatever extent whether conducted formally or informally or whether using the public hearing process or not.

It is widely recognized, that the primary purpose of investigation in casualties and other marine occurrences is to improve the safety of life and property in this mode of transport which has been probably the first to develop the method of identifying safety deficiencies. These investigations are regarded as a form of preventive medicine through the process of finding out the causes of the occurrences, acquiring knowledge therefrom and recommending or sometimes imposing ways to prevent recurrences. Such investigations have resulted in major improvements in areas such as ship construction, lifesaving, and fire fighting equipment, traffic and other rules, such as the international regulations for the prevention of collision at sea, navigational aids and equipment, levels of competence of seamen, search and rescue. This primary purpose is reflected in the responsibility of the marine investigator, how he will be engaged in such investigations for finding out the facts and causes of casualties and making appropriate recommendations designed to eliminate or reduce safety deficiency.
2. **The Qualities of a Marine Investigator:**

The investigation and analysis of a marine accident is a highly specialized job which requires highly experienced professional personnel in the maritime field.

The marine investigator must possess the following qualities:-

1. Dedication to this kind of work.
2. Diligence and patience.
3. He must have a good sound working knowledge, of shipping and factors which affect operations as a whole.
4. Technical skills with practical background.
5. Perseverance, logic, and open-mindedness.

It is not sufficient to nominate a person with a speciality in shipping as investigator, as the occasion arises, because maritime accident investigation and analysis is a specialist task by itself. The standards of an investigator assigned to an accident inquiry determines the thoroughness and quality of results obtained which depends very much on the experience of the investigator. In other words long experience in the maritime field is a major element for an investigator. The more he serves and gains experience, the better the quality of results will be.

The investigator must, at least, carry one of the following qualifications:-

1. Master mariner certificate.
2. First marine engineer.
3. Bachelor of engineering (naval architecture and ship design branch).

He should also have a professional background on board ships as a master, deck officer, or marine engineer.
Regarding the personal qualifications of a casualty investigator, it is very important to stress the demand for integrity. This means that he should be inaccessible to any pressure, ranging from clear attempts of bribery, veiled threats of revenge in the form of withheld promotion, deteriorated conditions of work or dismissal. Also he must not be influenced by irrelevant considerations. In other words he will speak out and tell the authorities, companies, and those in charge of safety, that in the course of investigation he has found serious deficiencies within their services which have to be rectified. He must also be challengeable, for example, there are particular circumstances that can put the confidence in the investigator's impartiality in doubt, e.g., he or one of his closest relatives is related to the victim. This situation of challenge should also be tried on the expert who has been appointed to assist in the casualty investigation.

It is desirable that the investigator has an accident as a foundation on which to develop his skills, a professional ships officer's background, marine engineering qualifications or appropriate experience in specialized areas of shipping such as operations, piloting, meteorology, naval architecture, seamanship, etc.

**Designation of Marine Board (Committee) of Investigation:**

If as a result of an investigation into a casualty, upon recommendation of a maritime administration or receipt of information (authority) from any other source, it appears to the administration that the marine casualty or accident is of such magnitude or significance that further investigations would tend to promote safety of life and property at sea and would be in the public interest, the administration will...
designate an appropriate marine board (committee) of investigation to conduct such investigation forthwith.

Membership of a Marine Board (Committee):

The board (Committee) will usually be composed of three members designated by the General Director of the authority responsible for the marine casualty investigation. The senior member shall be chairman and the authority (G.D.A.) may also designate specialists or technical experts to assist the Committee. Designation of the Committee members will be first by a message and it will be later confirmed by the receipt of a confirmation letter.

Qualifications of Marine Board (Committee) Members:

Recommendations for marine committee members should be based on the nature of the casualty to be investigated and availability of qualified personnel. A senior officer (marine person) of wide experience should be selected as chairman, consideration should be given to assigning the other two members who should have a broad marine safety background. In many cases it is also important that the two committee members have professional qualifications other than those of the chairman. It is common that the chairman who is usually a master mariner is assisted by two members, one of which has experience in marine engineering and the other has a legal background.

<table>
<thead>
<tr>
<th>Master Mariner</th>
<th>Chairman of the Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine Engineer</td>
<td>Member</td>
</tr>
<tr>
<td>Legal Person</td>
<td>Member</td>
</tr>
</tbody>
</table>
Finally, it is worth mentioning that the casualty investigator has three other qualities as can be understood from the above:

1. He must have the ability to work fast and efficiently so that a correct result is reached as quickly as possible, for all parties involved it is crucial that the cause of the events leading to the casualty is found rapidly so the right preventive steps can be taken immediately. It is obvious that hastily made and erroneous reports on the causes of marine casualties may result in serious consequences for the safety at sea.

2. The investigator must be able to express himself well, both orally and in writing. The papers and reports written by the investigator must be in a light and straightforward style with clear expressions about his opinion and designation. He should also be able to speak well, making himself understood easily while arguing in favour of the report and its recommendations.

3. It is important that the investigator can get on well with people, in order to establish contact with those involved in the accident and win their confidence. A lot can be achieved if the investigator exercising with several authorities and not behaving in a bureaucratic way. This also means that the psychological balance of the investigator is put to a severe test as he must often work under high time pressure, and sometimes also pressure from the involved parties and the mass media.
4. Distinguish clearly between "error of judgment" and "negligence" as regards his conclusion regarding an act of omission or commission on the part of any seafaring.

5. To remember the purpose and objectives of the inquiry.

6. To ensure that the proceeding and the report of the inquiry are such as to be capable of forming a proper basis for the decision of the government, regarding further follow-up action(s).

In order to carry out these duties effectively, it is essential that the maritime accident investigators are provided with suitable statutory powers which should, nonetheless, be used with discretion. The investigator will come in contact with many kinds of people, some of whom are less familiar with his activities and are not willing to give evidence because of natural desire not to become involved. In this latter circumstance it may be necessary for the investigator to explain his function and to obtain their willing co-operation.
3. The Duties of the Investigator:

The main purpose of marine casualty investigation and its analysis is to obtain information to be used for the prevention of similar casualties as far as practicable. It is necessary that the causes of casualty be determined as precisely as possible in order that detailed factual information will be available for review and statistical studies. It is not sufficient to know only HOW a casualty occurred, and who was responsible, but it must also be clear WHY it happened. Based on this information appropriate corrective measures, regulations, and standards of safety may be developed and instituted, or legislation for marine safety may be recommended if needed. Therefore, the duties of the investigator are a difficult task.

The main items to be covered by the investigator can be stated as follows:-

1. Find out facts.
2. Obtain all the relevant information.
3. Determine as precisely as possible the causes of the casualty.

In this regard he needs to fully appreciate that he is undertaking a solemn duty, for which he would have to:-

1. Show great patience and understanding in examining witnesses.
2. Remember to place himself "in the shoes" of the witness when recording his statement, so as to be able to understand the relevant circumstances properly.
3. Appreciate the fact that his conclusions and recommendations may have far-reaching consequences affecting the carrier(s) of seafarer(s) and shipowners concerned.
Inquiries:

There are two levels of marine inquiries:

1. Preliminary inquiries.
2. Formal investigations.

The preliminary inquiries are designed to establish the facts of the casualty to the end that the board (commission) may be able to decide whether a further more formal inquiry should be convened. The preliminary inquiry is conducted at a confidential level and its results are not, except in some exceptional cases and under strict regard to the board's impartial status, disclosed to the public.

The formal investigations are conducted in open courts, specially set up for the purpose of discovering the cause or causes of the casualty, of promulgating any lessons to be learned from the circumstances and of dealing disciplinarily with any person(s) found responsible for causing the casualty.

A formal investigation need not be preceded by a preliminary inquiry, although in actual practice the assembling of evidence for presentation to the court of inquiry will in most cases call for the exercise of the statutory powers normally associated with a preliminary inquiry.
4. PRELIMINARY INQUIRIES

Purpose:

The purpose of a preliminary inquiry is to obtain evidence of the causes of a casualty, and provide information and material upon which the board may determine whether or not a formal investigation is necessary.

Investigation:-

Investigation has been defined by CGMSM as the patient inquiry into a matter with systematic attention to details and relationship, derived from a word meaning a footprint. It accurately implies the attempt to acquire a current picture of a prior event and is a planned search for facts and evidence through interviews, interrogations, observations, record examinations and proper interpretations of physical evidences. The technique of investigation is an art for which only general rules and few guiding principles can be outlined.

A successful investigation is one in which the evidence is completely handled, witnesses are intelligently questioned, all leads are fully developed and the case is comprehensively but concisely, clearly, and accurately reported.

Sources of Information:

There are numerous sources of information available to an investigator which may indicate that an investigation is warranted, these sources are:-
- Master of the vessel.
- Crew members.
- Shipping companies.
- Witnesses (pilot, passengers, etc.)
- Maritime organizations.
- Underwriters, shipping agents.
- Police.
- Other units.

Procedure of Preliminary inquiry:

The decision to order a preliminary inquiry into a shipping casualty is made by the administration responsible for the casualty investigation (S.A.), according to the initial information on the circumstances and effects of the casualty.

Duties of the Investigator:

The duties of the investigator in conducting a preliminary inquiry can be classified as follows:-

a. To inform the government (ministry concerned) of the shipping casualty having occurred within its jurisdiction.

b. To hold a preliminary inquiry, when considered necessary, into the shipping casualty, and for this purpose if necessary:

1. To go on board the ship involved in casualty and inspect the same or any part thereof or any of the decks, machinery, boats, equipment or articles on board.

2. To enter and inspect any premises the entry or inspection of which appears to him to be requisite for the purpose of the report.
he is directed to make.

3. To summon under his hand, require the attendance of all persons he thinks fit to call before him and examine for such purpose and to require answers or returns as deemed necessary for the purpose.

4. To require and enforce the production of all, books, papers or documents which he considers important for the purpose of investigation.

5. To administer oath, or in lieu thereof, require any person to be examined by him to make and subscribe a declaration of the truth of the statement made by the investigator in his examination.

c. In particular, the investigator should ensure that adequate coverage is given to the following items:-

1. The sequence of events leading up to the casualty.

2. If loss of life occurred, how it was caused.

3. Any defect(s) in the hull, machinery or equipment of the ship which may have led to or contributed to the casualty.

4. The adequacy and functioning of the safety appliances with which the ship was provided and the effectiveness of the precautionary or remedial measures which masters are instructed or advised to take. And whether any injuries or death may have been due to causes which may have been prevented if other appliances had been available or other advice or instructions had been issued.
5. The qualification of master, engineering officer, and crew members.

6. The operation and efficiency of navigational aids, and radio equipment.

7. The nature of the damage to the ship or caused by the ship in consequence of casualty.

d. **Effect on Environment:**

Where as a direct or secondary consequence of a casualty, the immediate or further environment of the ship has been affected by pollution through loss of hazardous cargo, or where fire has spread to adjacent vessels or shore installations, full details of the extent, volume and effect of such pollution or damage should be given, together with a description of remedial measures and repairs, their effectiveness and approximate costs.

e. **Statement of Facts:**

The above information should be included in depositions or statement of facts, but useful information received in any other manner should always be included in the report and preferably substantiated in supporting documents. Details of the qualification and experience of personnel involved and any impressions gained as to the quality and efficiency of managers, are always useful and often invaluable when questions of competence are being considered.
CASUALTY INVESTIGATION

Notification of Marine Casualty

Decision of Preliminary
S.A. or Other Authorities Concerned With Marine Casualties

Inquiries

Investigation and Inspection

Marine Investigator
- Qualification
- Qualities
- Equipment

Casualty Report
- Legal/Technical Report
- Conclusion
- Recommendation

Preliminary Inquiry

Formal Investigation

- Ships Master
- Ships Crew
- Witnesses
- Other Ships
- Shore Observers
1. Standardisation in the presentation and format of preliminary inquiry reports is desirable for a number of reasons:

1.1 In many cases a preliminary inquiry is the forerunner of a formal investigation and the report then takes on the nature of the brief presented to treasury solicitor and ultimately to the board's counsel.

1.2 In cases where a formal investigation does not follow a preliminary inquiry, but other administrative follow-up is contemplated, a badly arranged report will hamper the heads of the S.A. staff in collecting the relevant points for consideration. Also if the documents are relating to the report of other matters, it may happen that the letter or paper requiring attention may be overlooked or delayed.

1.3 Occasions frequently arise where information has to be retrieved for analytical or statistical purposes and it is intended that the casualty data will be organised to lend itself to data bank.

1.4 It is possible that policy considerations may in future lead to the publication of certain preliminary inquiry reports.

2. As a general guide to the compilation and presentation of preliminary inquiry reports and supporting material the following points should be borne in mind:

2.1 The preliminary inquiry report should be clearly separate from
supporting documents such as plans, charts, log book extracts, statements, certificates, etc. and should preferably be enclosed in its own clearly labelled folder.

2.2 Supporting documents, when bulky, should not be accommodated on the casualty file but should be housed in clear labelled packets.

2.3 The covering minute in which the investigator announces the completion of his preliminary inquiry report should indicate the investigator's opinion as to whether the circumstances warrant, (further action or not), giving his reasons in respect of either course.

3. A proper preliminary inquiry report should be in five separate and distinct parts:

3.1 A brief introduction summarising the chief features of the casualty.

3.2 A full description of the ship or ships with emphasis on those parts involved in the casualty.

3.3 A chronological and factual account detailing the sequence of events leading up to the casualty together with the circumstances attending and the events immediately following the casualty.

3.4 The investigator remarks upon any aspect covered by item No. 3.3 above to explain or elaborate the facts, to point out any deficiency of equipment or failure of those on board to take steps which might avoid the similar casualty in future.
3.5 A conclusion in which the investigator should state his findings as to the principal and contributory causes of the casualty.
6. NARRATIVE REPORT

Introduction:

The main purpose of the investigation report is to provide detailed factual data on which to base appropriate corrective measures. The report should be in narrative form and consist of the following main parts:

- Subject.
- Topic.
- Vessel and cargo data.
- Record of dead and injured.
- Accident circumstances.
- Conclusion.
- Recommendation.

Besides that, the report should not be unnecessarily lengthy, findings of fact should be limited to those raised by the casualty, and only to the degree necessary to acquire an understanding as to what happened, how and why the casualty occurred.

Subject:

The subject description of the report should include:

- The name(s) and official number(s) and nationality of the vessel(s) involved.
- The type of casualty (Collision, fire, etc.)
- The geographical area where it occurred.
- date of casualty.
- Personal injury or loss of life sustained.

**Topic:**

The narrative report should begin with a topical paragraph consisting of a succinct description of What, When, Where, Who, and results of the investigation. (Very brief description.)

**Vessel and Cargo Data:**

1. **Vessel Data:**
   - Vessel name.
   - Official number.
   - Type of the vessel (cargo, bulk, tanker).
   - Gross tons.
   - Net tons.
   - Length, breadth, depth.
   - Type of propulsion (turbo, electric, steam).
   - H. Power.
   - Home port.
   - Nationality.
   - Owner/operator.
   - Name of the master.
   - Qualification of the master.

**Note:** In case of motor boat accidents the report should include a comprehensive description of the boat involved, such as freeboard, hull material, estimated weight, type of fuel, etc.
2. Cargo Data:

In case the vessel's cargo plays a role in the casualty, a full description of the cargo should be included in the report. This description should include:

- Type of cargo and condition (dry bulk, heated, cooled).
- Trade name.
- Quantity.
- Shipper(s) and consignee.
- Copies of the cargo manifest should be obtained.

Record of Dead and Injured:

The report must include a list of those persons killed or injured, as a result of the casualty. This list should contain the name, rank, age, and home address.

Accident Circumstances:

The accident circumstances or the weather prior to and at the time of the casualty, such as wind currents, tides, emphasizing visibility. The investigator must determine the weather forecast for the casualty period and whether such forecast was obtained by the operator before sailing. Also all data about the radars and navigation equipments and other relevant information should be obtained in detail, specially in case of collision or grounding casualties.

Body of the Report:

This part of the report is the most important part in the casualty
In this part the investigator must explain precisely the circumstances of the accident and all facts substantially supported by the evidence and witness testimonies. Also all the facts on which conclusions are based should be included.

Conclusions in the Narrative Reports:

General:

The conclusions of the marine accident is written by the investigator after explanation of the circumstances of the accident and based upon facts, the testimonies, and evidence derived in the investigation. The conclusions should not attempt to establish a legal case for hearing by commenting with court citations, but it reflects the investigator's opinion as to the cause(s) of the casualty. The conclusions must cover the following points:-

1. Causes of the casualty.

2. Resolving conflicting evidence in conclusions.

3. Description of navigation and ship's equipment.

1. Causes of the Casualty:

   a. Proximate Cause:

      The proximate cause of the casualty shall be stated to the extent determinable, the cause(s) based on the facts, and available evidence.

   b. Contributing Cause(s):

      Any contributing causes to the accident, shall be stated to the extent
determinable, such as adverse weather or sailing condition, distracting elements, fatigue, inadequate training or supervision, lack of qualification, or inexperience, etc.

c. Description of Cause(s):

The investigator must explain in details the cause(s) of the accident and describe how the cause(s) effect the accident directly, and not to identify only cause(s) such as "ship unseaworthiness" but he must describe how and why the ship is unseaworthy.

d. Negligence:

In general most casualties (about 80%) of the ships' accidents can be traced to some types of human error(s), specially the collision and grounding casualties. There are many instances in which such error is considered as negligence rather than an error in judgment. The court's decisions and legal rulings have laid a foundation for determining what constitutes negligence as the failure to exercise that care which a reasonable and prudent person would exercise under similar circumstances. It is incumbent for the investigating officer to refer to the court's decisions. Normally and according to S.A. regulations as published, an appeal decision to determine if the circumstances surrounding the casualty indicate evidence of negligence, certain acts are not by themselves considered prima facie evidence of negligence. The question which the investigator resolves is where the casualty might have been prevented through the exercise of ordinary care, caution, and maritime skills.
In the end, the determination of evident negligence must be based upon a reasoned exercise of deliberate judgment, not upon an artificial listing of possible elements.
7. **THE RECOMMENDATIONS**

The recommendations should be based upon the findings of fact and flow logically from the conclusions. Unsupported and non-pertinent recommendations must be avoided. Recommendations should be clear, simple, and easily understood. To be helpful and informative, recommendations should generally be limited to such remedial action as is indicated in the particular case. The individual casualty investigation may disclose, among other things, a specific material or personnel fault, a specific instance where applicable regulations are not sufficient, or a lack of experience on the part of a specific individual. Specific recommendations for remedial action are proper in such instances. To make further development of effective recommendations, investigative personnel are encouraged to consult with district and Headquarters level program managers prior to finalizing recommendations regarding broad problem areas. Broad recommendations that go beyond the casualty reported or that are not connected with the casualty cannot be approved. In those cases where all possible action has already been taken, the recommendation should be that no further action be taken and that the case be closed.
8. **FORMAL INVESTIGATIONS**

The primary considerations which lead to a decision to hold a formal investigation are:

a. Whether it is likely to throw additional light on the cause of the casualty which is not clear from the preliminary inquiry.

b. Whether it is likely that by establishing the circumstances of the casualty publicly, the resultant publicity will prevent a recurrence of similar casualties and thereby secure additional safety of life at sea.

c. Whether, if the casualty is one involving heavy loss of life, or is one which has attracted considerable public attention for some other reason, a public inquiry would restore public confidence.

d. Whether it is indicated by the preliminary inquiry that there has been default or negligence on the part of the master or officers and that disciplinary action is desirable.

Consideration (d) above is a very important matter affecting safety. An officer who causes a casualty through exceptional negligence, recklessness or gross inefficiency is a potential danger at sea and his public disciplining can not only contribute to general safety but also serve as a useful deterrent to others.

As a rule, a formal investigation is not ordered until the findings and conclusions of a preliminary inquiry have been carefully considered in the light of these criteria. In certain exceptionally serious casualties,
on the other hand, which have aroused wide public concern, the Minister
when making an early statement in Parliament, may announce reads out the
questions upon which it has been decided to take the opinion of the
Court, these being very carefully prepared to ensure that all points
relative to the casualty are covered. The Board's case is then complete
and the other parties in turn may proceed with their cases, calling
their own witnesses or recalling any of the Board's witnesses and
examining them. Finally, when all the evidence has been heard, the
representatives of each of the parties are invited to address the Court,
the Board's representative being the last to do so. The Court then
adjourns to consider its findings.
9. THE INTERNATIONAL OBLIGATIONS
AND TECHNICAL REPORTS TO I.M.O.

The coastal states have an international obligation to issue the technical reports for all accidents and marine casualties occurred in the territorial waters, specially those resulting total loss or loss of life, and notify the IMO by these reports.

In fact the Maritime Safety Committee (IMO) suffers from shortage of information concerning marine casualties. This fact has appeared in the annual report for analysis of serious casualties to tankers of 6000 GRT and over. In the report No. MSC 52/18, of 1.11.1985, concerning investigation into serious casualties, during the period from July 1978 until 31 December 1984, the total number of reports requested from administrations was 868, out of this number 372 reports have been received while 496 reports are still outstanding, which means 57% of total number of reports.

The main causes of delaying reports are:-

1. Shortage of information about the accident.

2. Shortage of marine personnel in the field of marine casualty investigation.

It is necessary for all the coastal states to provide IMO with the technical reports to help the organization in making the essential analysis report in order to discover the weak points leading to the accidents in general, hence to issue the international recommendations, to improve the safety at sea and decrease the number of accidents.
The IMO has established a reporting system since July 1978. In the fifty-second session of the Maritime Safety Committee it has adopted the amended Marine Casualty Report Form (Annex 1) which includes a means of classifying the casualties. Administrations are urged to complete this form in respect of casualties to ships of not less than 1600 GRT which are total loss, including a constructive loss and to ships of not less than 500 GRT involving loss of life.

The information to complete the form should be based on:-

1. The report of a Court of Board of Formal Investigation, or
2. The report of preliminary investigation carried out by the Administration, or
3. The report of an informal fact finding investigation carried out by the Administration.

The summary of IMO provisions concerning accident investigation reads as follows:-


1. Directs each Administration to conduct an investigation of any casualty to any ship for which it is responsible and which is subject to this Convention when such an investigation may assist in improving the Convention.

2. The findings of such investigations shall be furnished to IMO without disclosing the identity or nationality of the ship and
without disclosing the responsibility of any ship or person.


1. Intent is to ensure that countries with substantial interest in maritime casualties are permitted to be represented at the inquiries, and to encourage international unified investigation practices.

2. Recommends that the country conducting the inquiry shall, subject to national rules, allow a representative of a country with substantial interest to attend and participate in the inquiry.

3. This recommendation does not apply to any preliminary or informal inquiry.


1. Directs each Administration - to ensure that countries with substantial interest in maritime casualties are permitted to be represented at the inquiries, and to encourage international unified investigation practices.

2. Recommends that the country conducting the inquiry shall, subject to national rules, allow a representative of a country with substantial interest to attend and participate in the inquiry.

1. Draws attention to the obligations of contracting Governments to investigate casualties as stated in the Convention and to supply IMO with information about the lessons to be learned and the conclusions.

Conclusion:

It is important to the Maritime Countries to establish the necessary infrastructure to conduct inquiries and to meet the national and international obligations concerning the marine casualty investigation. The success of the investigation system depends on the efficiency of the marine personnel dealing with the marine casualties.
CHAPTER III

THE MAIN POINTS, GUIDELINES WITH CHECK-LIST FOR MARINE CASUALTY INVESTIGATION
General:

Some casualties are the result of single cause, but most of them are the combination of factors, conditions, and contributing causes. In order to make a full evaluation of the case, the investigator must necessarily obtain sufficient information to reconstruct all of the pertinent events leading up to the casualty. The checklists give the investigator very good room to obtain all the information relating to the casualty. In this part we present checklists for two of the most common casualties which are:

- Collision, and
- Grounding.

1. Collisions:

1.1 Faults:

In most cases when a collision occurs, one or both vessels are at fault. In most instances there is a violation of the Rules of the Road - sometimes deliberate - but more often because the commanding officer of one vessel merely disregards the rules in consequence of a guess as to the intention of the other. To determine if this is a factor in a case under investigation, it is often advantageous to ask the witness the reasons behind certain actions and maneuvers, particularly if the account does not appear to be logical or appears to be in conflict with what would be considered prudent under the circumstances.

The inevitable question that arises is why does such high number of collisions and groundings occur? The answer to this question can only be that the causes of many such casualties are due to human errors or failure to observe certain basic principles and apply the necessary measures.
The following two principal factors would seem to be the main causes for collision and groundings:

a. Failure to keep a good look out.
b. Weaknesses in bridge organisation.

Also in the case of restricted visibility:

a. The high speed of the vessel.
b. Lack of information obtained from radar.

1.2. Diagrams

When investigating a collision case, the use of plotting diagrams is highly desirable. Plotting diagrams made on the ship should be thoroughly gone through with the competent officer in command. Furthermore, the competent officer in charge should be required to make a diagram showing the relative positions of the two vessels at the time they began navigating with respect to each other. This should be followed by similar diagrams at other important points in the witness's testimony. Each diagram should have an explicit heading, for example: "Relative positions of the two vessels when I sounded the first one blast signal" or "Relative positions of the two vessels when I ordered back full", etc. The final diagram by navigation witnesses should show the two vessels at the time of impact.
2. GENERAL CHECKLIST

Date: ...................................  Port: ...................................
Type of Casualty: ........................  Position: ............................

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. SHIP DATA</td>
<td></td>
</tr>
<tr>
<td>1. Name</td>
<td></td>
</tr>
<tr>
<td>2. Official number and/or identification signal</td>
<td></td>
</tr>
<tr>
<td>3. Charterer/ship owner.</td>
<td></td>
</tr>
<tr>
<td>4. When and Where built.</td>
<td></td>
</tr>
<tr>
<td>5. Last Inspection, date &amp; Place (Certificate of Inspection</td>
<td></td>
</tr>
<tr>
<td>6. When and where last dry docked.</td>
<td></td>
</tr>
<tr>
<td>7. Seaworthiness and load line certificates and other certificates, control book.</td>
<td></td>
</tr>
<tr>
<td>8. Logs (official, engine room, oil, working hours)</td>
<td></td>
</tr>
<tr>
<td>9. Type of vessel</td>
<td></td>
</tr>
<tr>
<td>10. Length, depth, breadth</td>
<td></td>
</tr>
<tr>
<td>11. Gross tonnage</td>
<td></td>
</tr>
<tr>
<td>12. Net tonnage</td>
<td></td>
</tr>
<tr>
<td>13. Deadweight (carrying capacity)</td>
<td></td>
</tr>
<tr>
<td>14. Type of engine</td>
<td></td>
</tr>
<tr>
<td>15. Engine power (EHK)</td>
<td></td>
</tr>
<tr>
<td>16. Normal full speed</td>
<td></td>
</tr>
<tr>
<td>17. Hold cargo</td>
<td></td>
</tr>
<tr>
<td>18. Deck cargo</td>
<td></td>
</tr>
<tr>
<td>19. Ballast</td>
<td></td>
</tr>
</tbody>
</table>
### B. CREW DATA

1. Number and composition of crew, crew list.

2. Decision on minimum crew, training, qualifications

3. Active duty/relief system.

4. Safety committee and its composition; where appropriate "Safety Officer".

5. General state of health of crew, any necessary inoculations, prevalent infectious diseases (common colds, gastric catarrhs or similar).

6. Drinking water on board, evaporated or taken from land, perishable provisions.

7. Great working load, last port of call, consumption of alcohol.

8. State of health specifically for those involved in the casualty, medical certificate, issued by whom, particularly with regard to faculty of vision and hearing, sense of colour, (if possible scotopic vision, perception, noise level injury, coordination ability, etc. should be ascertained).


10. Working hours before casualty and during the preceding twenty-four hours/week.

11. Poisonings; alcohol, narcotics, work with or near chemical products and solvents and similar.

12. Mental disturbances, social adjustment, any personal problems, former diseases and/or accidents.

13. Design of place of work from an ergonomic aspect.
### 3. CHECKLIST IN CASE OF COLLISION

#### A. NAVIGATION EQUIPMENT, ETC.

Determine type, condition and whether or not in use as applicable.

1. Radar
2. Loran
3. Omega
4. Decca Navigator
5. Decca-writer, maneuver plotter
7. Teletyper for satellite navigation.
8. RDF
9. Sounding Machine
10. Echo Sound
   (Sounding diagram to be gone through)
11. Log, docking log.
12. Whistle
13. Running lights
14. Signal figures
15. Compasses (magnetic, gyro, repeaters)
16. Course recorder, maneuver recorder.
17. Steering device
18. Rudder Indicator.
19. Turn Speed Indicator.
21. Tachometer.
22. Charts in use
23. Sailing descriptions, local maritime traffic instructions, instructions regarding separating of traffic, etc.
24. NTM or UFS
25. Shipping company instructions.
26. Standing orders and night orders.
27. Ship's bell, central bell, any possible notebook over time comparisons between deck and engine room.
28. Chronometers and chronometer log.
29. Log books:
   a. Ship's log.
   b. Engine room log.
   c. Combined ship and engine room log.
   d. Other notes.
   e. Oil record book.
30. Bridge to engine room signal system.
31. Steering gear
   b. Auto Pilot (Magnetic or Gyro Compass)

B. SPEED AND MANEUVRING DATA

1. Type and horsepower of engine(s)
2. Vessel speed vs. RPM
3. Vessel speed vs. engine order telegraph setting
4. Time required by engine room to comply with engine orders at normal headway on open sea and at standby
5. Time needed at different speeds from ordered maneuver to stop and corresponding stopping distances.
6. Different turning diameters, maneuver diagrams.
### C. ADDITIONAL DATA

The following additional data may be necessary to complete the ones before.

1. Type of reversing gear on reciprocating engine.
2. If the vessel is turbine driven - Vacuum in Pa. (Pascal)
3. Type of main boilers and steam pressure.
4. Screws (numbers, type, diameter, pitch, blades, slip)
5. Steering propeller, fore and/or aft.

### D. COMPASS DATA

1. Gyro compass.
3. True course.
4. Compass Course.
5. Last determination of deviation.
6. Last course control.

### E. RADIO BEARINGS

1. Last determination of radio deviation.
2. Type of radio bearings.
3. Frequencies.

### F. PERSONNEL DATA

All navigation witnesses should be questioned as to how long they had been at the helm, on the look-out or otherwise on watch or up and about, prior to the casualty.
G. INFORMATION AT POINT "X"
(With sketches, if possible)

"X" = The point at which the vessel starts navigating with respect to the other vessel.

1. Tide and current.
2. Course and speed with indication of time.
   a. Through the water.
   b. Over the ground.
3. Miscalculation of course.
   a. Deviation (gyro failure)
   b. Delineation.
   c. Leeway.
4. Distance and bearing to the other vessel (how these indications have been determined).
5. Situation (meeting, crossing, overtaking or special circumstances).
   a. How determined.
   b. Navigation lights, signal figure.
   c. Angle between the courses of the two vessels.
6. Rules of the Road applied.

H. INFORMATION FROM POINT "X" TO COLLISION
(With sketches, if possible)

1. Speed (through water) with times of change.
2. True courses steered with times of change.
3. Bearings and radio locations of the other vessel with times taken and indications as to how the bearings have been determined (radar, gyro, repeater, pelorus, etc.)
4. Distance to the other vessel with times and indications as to how the distance has been determined (radar, estimate, etc.)

5. Whistle or other signals with times.
   a. Given
   b. Observed
   c. Lifeboat and fire alarm.

6. Other steps taken to avoid or minimize effect of collision.
   a. As for instance precipitated use of anchors.
   b. Switching over from auto-pilot to manual steering.

7. Changes in visibility, wind and current, if pertinent with time indications.

8. Changes in navigation lights and signal figures displayed.

9. Personnel changes of watch with:
   a. Times.
   b. Licenses or certificates held.

I. RADAR

1. Type of radar.
   a. Year and make.
   b. Size of scope, performance.
   c. Frequencies.
   d. Range scales.
   e. Anti-collision systems.

2. Operating condition.
   a. Radar started and arranged by ......................
   b. In use since .....................
c. Stand by since..............

d. Radar picture good, bad, or middling.

3. Extent of sea return on each range scale.

4. Plotting:
   a. "Overlay".
   b. Plotting paper.
   c. Other method, i.e. anti-collision system with plotter.

5. Qualifications of operator.
   a. Other duties of operator.

6. Orientation of working method, true or relative plotting.

7. Last serviced.

8. Instructions for operating.
   a. Manufacturer.
   b. Vessel.
   c. Bearing mistakes, blind sectors.

J. DATA AT COLLISION

1. Speed of vessels at impact.
   a. Own vessel.
   b. Other vessel.

2. Mutual position of vessels at impact (with sketch).
   a. Collision area of own vessel.
   b. Collision area of other vessel.
   c. Angle at impact between vessels.

3. Damages:
   a. Own vessel.
### K. EVENTS AFTER COLLISION

1. Movement of vessel after impact.
   a. Actions taken to give aid to own vessel.
   b. Actions taken to give aid to other vessel.
   c. Assistance needed or rendered.

2. Secondary casualties:
   a. Fire.
   b. Explosions.
   c. Capsizing, listing, leak, foundering.
   d. Others.

3. Signals:
   a. Distress signal from own vessel.
   b. Distress signal from other vessel.
   c. Abandon own ship.
   d. Abandon other ship.

4. Lifesaving equipment:
   a. Used.
   b. Effectiveness

5. Firefighting equipment:
   a. Used.
   b. Effectiveness.

6. Crew and passengers:
   a. Conduct.
   b. Actions.

7. Air temperature.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 8. | Water temperature  
    | (If person has gone over board) |
| 9. | Material and equipment faults. |
Source of data: Shipping Statistics, November 1985
4. GROUNDING

A. Common Causes:

The following features have been noticeable as a cause of groundings:

1. The failure to pre-plan a track.
2. The failure to check position frequently to ensure that the planned track is maintained.
3. The failure to take immediate action to regain track when off it.
4. The failure to cross check fixes by one means with another.
5. Undue reliance on navigational aids when visual fixing is possible.
6. The failure - as a matter of standard internal organization - to ensure that an important navigational decision is checked independently by another officer.
7. The failure to observe the echo sounder display carefully and regularly when making a landfall of navigating in coastal waters.
8. The failure to check meticulously the characteristics of a light when it is first observed in order to ensure, without doubt, that it is the relevant light.
9. The failure to ensure that when relevant Notices to Mariners
and radio navigational warnings have been received, the charts concerned are corrected promptly.

B. Coastal Waters:

In coastal waters the most common causes are undue reliance on buoys to the exclusion of other means of checking position, bank suction and bank cushion effect, depth of water less than anticipated due to abnormally low water or tides or silting. Some groundings can only be ascribed to deliberate risktaking.

C. Vessel Stresses:

Grounding of all kinds subject a vessel to unusual stresses, in spite of the absence of visible damage. The investigating officer, in addition to determining the cause, must be alert to any indications that the vessel's seaworthiness may have been adversely affected by the grounding.
### IMPORTANT POINTS

In addition to the general items set for ships data and crew (General Checklist), the following points may be pertinent in groundings:

5. **CHECKLIST IN CASE OF GROUNDING**

<table>
<thead>
<tr>
<th>A. NAVIGATION GEAR, ETC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type(s), condition, last overhaul/repair and whether the equipment has been in use or not.</td>
</tr>
</tbody>
</table>

1. Radar.
2. Loran.
3. Omega.
4. Decca Navigator.
5. Decca writer, maneuver plotter.
7. Teletyper for satellite navigation.
8. RDF.
10. Echo sound (sounding diagram to be gone through)
11. Log, docking log.
12. Whistle.
13. Running lights.
15. Compasses (magnetic, gyro, repeaters)
16. Course recorder, maneuver recorder (current diagrams to be gone through).
17. Steering device.
18. Rudder indicator.
19. Turn speed indicator.
20. Auto pilot, computer steering.
21. Tachometer
22. Charts in use.
23. Sailing descriptions, local maritime traffic instructions, instructions reg. separation of traffic, etc.
24. NTM or UFS
25. Shipping company instructions.
26. Standing orders and night orders.
27. Ship's bell, central bell, any possible notebook over time comparisons between deck and engine-room.
28. Chronometers and chronometer log.
29. Log books:
   a. Ship's log.
   b. Engine-room log
   c. Combined ship and engine-room log.
   d. Other notes.
   e. Oil record book.
30. Bridge to engine room signal system.
31. Steering gear:
   b. Auto pilot (magnetic or gyro compass).

B. EVENTS LEADING UP TO GROUNDING (IN OPEN WATERS)

1. Last position or fix:
   a. Time.
   b. Subsequent positions obtained by Omega, Loran, Decca, optical bearings, radio bearings, satellite navigation or dead count.
2. Courses and speeds from last position:
a. Times of changes.
b. Depth margins, squat effect at used speeds.

3. Visibility.

4. Sea conditions.
a. Tide and current.

5. Wind:
a. Direction.
b. Force.

6. Observations at aid to navigation.
a. Seen or heard.

7. Personnel on watch.
a. Deck (master, mates, pilot, lookouts, etc.)

8. Standby conditions.


10. Equipment failures.

11. Anchor(s) used.

12. Grounding:
a. Time.
b. Position (how determined)
c. Depth (stage of tide)
d. Channel (width and depth).

D. AFTER GROUNDING

1. Part of vessel aground (with sketch and indication as to state of bottom and sounded depths around the vessel).

2. Maneuvers or methods adopted to free vessel.
C. EVENTS LEADING UP TO GROUNDING (INSIDE THE ISLANDS)

1. Last position(s):
   a. How determined.
   b. Times.

2. Courses and speeds:
3. Assistance rendered.
4. Length of time aground.
5. Soundings of compartments.
6. Extent of damage to vessel and cargo.
7. Temporary repairs.
8. Temperature of water.
9. Lifesaving equipment used.
10. Actions.
11. Survivor's recommendations.

SOURCES OF INFORMATION:

** Navigation Casualty Report Scheme No. 15.
    Tanker Casualty Data Exchange Scheme No. 16.
    "International Chamber of Shipping".
CHAPTER IV

THE INQUIRY AND INVESTIGATION SYSTEM

IN EGYPT
The Inquiry and Investigation System in Egypt According to the National Law, Legislation and Regulations

1. Introduction:

When a ship sails, it may generally be subjected to a maritime casualty in the following seas:-

1.1 In the boundaries of the geographical region for a port from the State's ports.

1.2 Outside the geographical region but inside the territorial waters of the state.

1.3 Outside the territorial waters of the state, including cases which result of the damages which occurred in the ship or the group of ships can reach to:
   a. The territorial waters of the state.
   b. The shores of the state.

Also, such as the damages which are resulted from the pollution caused by the wreckage of the ships or a collision occurred between two ships.

2. The laws and rules enacted by the Egyptian legislator have been authorized which concern determining the persons who have the power to perform inquiry, and determining the authorities which are responsible for performing the preliminary investigations, and what to do in such events. With the course of time the laws and regulations have been issued which have become firmly deep-rooted and which determine the administration manner by which it proceeds in the
different accidents in accordance with circumstances of each of them. The accidents which occur in the maritime field, because of their characteristics and the manner by which they occur, are hardly of the same kind and there is rarely any similarity between two of them. As it is said "maritime accidents are like fingerprints which are seldom similar".

What concerns us here is that who are the persons who are determined by the law to perform the duties of:-

2.1 The initial inquiry.

2.2 Determining the manner by which the accident occurs and the reasons which led to it and whether there was a technical mistake.

2.3 Submitting the person who is confirmed to be responsible for the mistake to the competent authorities (disciplinary councils, the competent court), so as to inflict a punishment on him.

2.4 Issuance of the recommendations which guarantee the prevention of occurrence or repetition of such accident in the future.

Concerning some maritime accidents and maritime casualties, the law states that these accidents must be represented to the competent courts in the field of jurisdiction in which the accident occurred, namely:-

3.1 If the accident caused losses of lives.

3.2 If the accident led to occurrence of severe damages.
3.3 If the accident caused damages or harm in state properties.

3.4 If the accident caused excitation of the public opinion.

4. The laws and the rules which are enacted by the legislator determine the persons who have the authority to perform the inquiry, inspection and expressing their opinion in the different stages of progress of the procedures in the accident. These persons can be classified as follows:-

4.1 A representative from the competent authorities in accordance with the requirements of their profession.

4.2 Experts of Ministry of Justice:
   a. Those who are appointed in the office of experts of Ministry of Justice.
   b. Those who are enlisted in the register of experts which belongs to the competent court.

4.3 Independent experts.

5. The laws dealing with the different stages of the accidents are as follows:-

5.1 Initial inquiry.

5.2 Forming a Committee with a view to study the accident and to issue the ultimate report regarding the technical mistakes which occurred and to determine the person who caused them.

5.3 Submitting the person who caused the accident to the competent court or to the investigation councils.
5.4 Determining an expert from office of experts of Ministry of Justice, or an expert from the experts of the table, or to mandate an expert who is distinguished by his efficiency so as to present an ultimate report about the accident.

(The judge might resort to the article number 5.4 in some cases, or he might enforce the report of the committee in accordance with the article number 5.2).

6. **The Maritime Surveyors:**

6.1 **Exofficio Experts:**

a. Law No. 79 of the year 1961 concerning the maritime casualties and maritime wreckage (79/61) in the fifth article about the agents of the Ports and Lighthouses Administration (P. & L.H.A.) indicates that when a maritime casualty occurs at any place in the Egyptian territorial waters, they should immediately go to the scene of the accident and take the necessary procedures to save the lives. They also take the necessary measures to prevent prevalence of the danger. The term danger here means the danger which may afflict the ship or the territorial waters or the shores such as harms of pollution after grounding of the ship, or collision of two ships. The law also determines the procedures which must be taken by the representative of the administration (we shall explain it completely in page No. ).

b. Law No. 97 of the year 1960 (3), regarding safety of the ships in the article (18), determines the administration
which has the right to ascertain safety of the ships, inspect them, and make sure that these ships are seaworthy. The representative of this administration (Ports and Lighthouses Administration) is as well entitled by the law to proceed with the judicial arrest, if he finds it necessary.

c. The decision of the President of the Republic No. 72 of the year 1968 (7) regarding prevention of pollution of sea waters by oil determines the authorities which have direct right to take the suitable procedures. They also have been granted the right of the judicial arrest in case of occurrence of an accident of pollution by oil. These authorities are as follows:-

i. Port's administration, and port officers.

ii. Representatives of the Port and Lighthouses Administration.

Further the article No. 22 from the above mentioned law (7) determines the procedures to be performed by the authorities who have the power of judicial arrest. These procedures are as follows:-

iii. Control the crimes which offend against this law, and these crimes are as follows:

- Discharge of oils and oily mixtures in the sea.

- Breach of requirements of the consecutive international conventions which concern pollution of sea waters by oil and prevention of discharge
of oils and oily mixtures in accordance with the international convention concerning pollution in the sea, or non-adherence to the Oil Record Books.

iv. Going on board the ships and performing the necessary inspection and a complete survey.

v. Acquiring knowledge about the Oil Records and the ship's documents.

vi. Performing the necessary inquiry, writing a minute about the breach and submitting it to the competent authorities. The specification will be held by the court having jurisdiction in the nearest port of the accident location.

d. Law No. 167 of the year 1960 concerning the security system and discipline on the ships as determined in the article No. (6, 7) defines the authority in charge of performing the investigation into the accident as the Ports and Lighthouses Administration. The same law determines as well the Technical Committee which is concerned with hearing and investigating the technical mistake, the person who is responsible for this mistake, and the manner of disposition in the ultimate decision and manner of lodging a complaint against decision of the Committee. (This will be explained with more details in page No. ).

e. It is apparent from the above mentioned that the numerous laws have determined the authorities who are responsible for performing procedures of investigation in the maritime accidents and casualties (stranding, collision, explosion,
etc.) as well as the pollution accidents. These authorities are as follows:

i. Port and Lighthouses Administration. Safety Administration. (Maritime Inspection)
The maritime surveyors who are appointed in the Administration.

ii. Representative of Port Authority, Harbourmaster or the person who represents him.

The Ports and Lighthouses Administration determines the scientific qualifications and experiences which are required for the appointments as maritime surveyors, maritime experts or engineers in accordance with internal regulations. These qualifications are as follows:

i. Master (F.G.) certificate. (Deck Maritime Surveyors)

ii. Engineering B. Sc. certificate (Maritime Engineers Experts)

iii. Chief Engineer certificate.

6.2 Experts of the Ministry of Justice:

In some maritime accidents and casualties, we may see that the administration in accordance with what is reported by the numerous laws concerning maritime accidents and casualties, presents the person who is responsible or being found to be the person who committed the mistake which led to the occurrence of the accident to the trial in front of the competent court which is a court of summary justice. This is through assigning
the papers of the accident to the public prosecution which assigns them to the jurisdiction.

Introduction:

The system of Egyptian jurisdiction is based upon the presence of one judge in the court of the first instance (court of first class). This system does not follow the system of jurors. In this system the judge needs experts who can clarify the technical reasons of the different accidents and explain the reasons of their occurrence, how they took place, the persons who caused their occurrence, and whether it was possible to avoid them. So on reviewing the accident the court has to:

a. Be satisfied by the report of the Committee which has been previously formed in the Administration.
b. Give an order to mandate an expert.

In case of emergency the court has either to judge to mandate one or three experts, or to give an order to form a Technical Committee. The law number 25 of the year 1968 (6) regarding issuance of confirmation law in the civil and commercial articles, the eighth chapter, articles 135 to 139, determined the procedures which must be taken by the court concerning mandating the experts, and the most important of these procedures are as follows:-

a. Determining an accurate statement about the expert's mission and the urgent measures which he is entitled to make.
b. Fixing the time to deposit the expert's report.

Consequently, we find that, the mission of the expert who is mandated by the court is completely limited by the decision of the court in this topic. He has neither the right to increase nor to decrease the order to which he is directed. This is by comparison with the Technical Committee which is formed by the responsible management in accordance with the law No. (4), and which has the freedom to progress the investigation in all trends and to issue the recommendations which recognizes them necessary. We find that in the articles 147/148 from the law No. (6), the expert is given the right to:-

a. Summon the parties who are concerned with the accident and to receive their statement.

b. Summon the witnesses (provided that he does not ask them to swear the oath except when the court gives a permission to do so), article number 148 from the law number (6).

c. Get knowledge of the necessary records, documents and papers.

d. Perform inspection if it is possible.

Moreover, the law number (6) necessitates that the expert must present the report at a fixed time. The expert's work is considered to be very important for which he must be highly qualified, both scientifically and practically, as to evaluation of the accident and writing the relevant report.

Historical Background of the Experts:

The experience in Egypt passed through different stages and
started in spite of the fact that it had no law to organize it till the law number 1 of the year 1909 was issued. This law determined the experts who were acceptable to the courts at that time. Most of these experts did not have the necessary technical qualifications for the missions to which they were directed. Later on the law number 75 of the year 1933 was issued and provided that those who are listed in the table of the experts must have a diploma which indicates that they have the technical qualifications necessary for the section in which they want to list their names. This law did not provide higher qualifications for the experts. So the section of experts remained as such without adapting themselves to the rest of the authorities that the law provided.

Afterward, the system of the official (appointed) experts was tried in 1934 by a section of those who held university certificates and qualifications. This system was successful and it was established in all courts and in 1934 an Administration was established for the experts so as to guarantee good guidance and instruction. The administration would be the authority from which all experts in all courts ask arbitration.

Some time later, the decree was issued by the law number 96 of the year 1952 which organized the experience in front of the authorities of jurisdiction (8), and determined the experts as follows:-

b. Unappointed Experts in the Experts' Office, whose names enlisted in a special table in each court which is used in case of emergency against fixed fees.

The general administration of experts in Ministry of Justice which performs inspection and censorship over reports of the experts is supposed to issue many reports, leaflets, and circular letters which aim toward:

a. Facilitating the mission of the experts in their work.
b. Unifying the legal opinions of the experts, by clarifying some of the legal points which imply confusion.

In addition to this, the administration is also supposed to give the experts some kind of guarantee so that they perform their missions with a higher degree of efficiency.

As you might have noticed from the circular letters, there have repeatedly been allusions to the ideal method and style of writing the ultimate reports and inquiry minutes.

Further, recommendations contained in the circular letter for maritime surveyors are few because of the fact that maritime cases which heard by the courts are few (compared to other cases such as civil and criminal). These maritime cases are always heard in the court of the ports, such as Port of Alexandria, Port Said, and Suez.
Qualifications of the Experts:

The law number 96 of the year 1952 regarding organizing the experience in front of authorities of jurisdiction (8), article (17), determined qualifications of experts to be appointed in the Experts' Office of the Ministry of Justice or to be enrolled in the table of experts as follows:-

a. To be of Egyptian nationality and have the capacity

b. To have obtained the higher scientific degree (Bachelor, license).

(As to the maritime surveyors, they must have F.G. Master or Senior Engineer's certificate (First Engineer).

c. The law has determined some other administrative certificates as well.

d. It is not permitted to appoint somebody in the position of an expert before ensuring his efficiency and fitness to perform the work to which he will be directed. Therefore, it is a common practice to hold a previous test for those who apply to occupy these vacancies so as to ascertain their fitness in the field of maritime surveyors. If the number of applicants are few and they mostly request to be enlisted in the experts register - and not appointed - so they are requested to present a certificate which identifies their previous experience in the different fields. This certificate is considered an essential condition to enroll in the experts' table.
7. **Marine Surveyors:**

With respect to sensitivity, the maritime cases which are submitted to the courts are very few (compared with the other cases such as civil or criminal). Yet, these cases are of special nature bearing in mind the heavy financial considerations which may amount to many millions of pounds, possible loss of life, and the damages which occur to the ship, the shores, the territorial waters and State properties. In case of damage to shore lines, such as pollution damage, there may be multinational implications of the accident involving considerable damages. For example, an accident of collision between two ships (A and B) from two different countries in the territorial waters of a third country (C), which causes pollution damages on the shores of a fourth country (D). Such accident should be followed by long procedures which require high experience in analyzing the accident and giving a decisive opinion. However, as was previously mentioned, the number of marine surveyors who are enlisted in the tables are few but they have capability. Most of them belong to the courts of the port of Suez, Alexandria and Port Said, and finally port of Damietta, the activities of which started in 1985.

7.1 **Qualifications of the Marine Surveyors:**

a. (F.G.) Master certificate / First Engineer certificate.

b. Experience certificate which clarifies the previous work that the surveyor has performed on the ship.

c. A certificate which indicates that he performed previous experience work in the field of the maritime surveyors.

d. To be of Egyptian nationality and have full civil
capacity relating thereto.

e. Not to have been found guilty of any criminal offense.

The surveyor submits these documents to the General Insurance Authority which is responsible for censorship over all insurance activities in Egypt. In this authority a committee is enlisted each six months which examines the documents and then issues a report which indicates acceptance or refusal of the person who has applied for the work as a surveyor. Afterwards all the documents will be submitted to the court in which the surveyor desires to work. If he is accepted his name will be enlisted in the table of surveyors whose assistance will be required in case of emergency. In this case the surveyor is not considered as appointed but he may be mandated by the court to express his opinion in a maritime accident in accordance with the decision of the court.

7.2 Independent Surveyors:

Some experts perhaps prefer to construct a private service office for maritime work to perform the following private services:

a. Present consultations to the owners of the ships.
b. Inspect the goods.
c. Participate in works of arbitration between owners of the ships and owners of the goods.

In this case it is not provided that the surveyor must be enlisted in the experts' table which belongs to one of the courts, but he must obtain permission from the General Insurance Authority which entitles him to practice the occupation.
Further, on presenting some cases to the disciplinary council, the presence of a person from the commercial navy whose degree is not less than the degree of the accused is provided. In these cases, the Independent Surveyors usually perform this mission. With their considerable knowledge about the legal aspects, they might as well be mandated to the cases which are lodged with the courts, by a verdict from the court, or to a committee which may be formed by order of decision from the prosecution as mentioned in the collision case No. 24 in 1982 in the internal anchorage area in the harbour of Alexandria, and the decision was as follows:--

A Technical Committee to study the accident was formed from:--

a. Vice/Manager of the Ports and Lighthouses Administration.

b. A pilot of Alexandria Port Authority.

c. A Master of one of the commercial ships.

CONCLUSION:

At the end of this chapter we come to this conclusion that the Marine Surveyors are classified in three groups:--

1. Official Surveyors.

2. Ministry of Justice Surveyors.

3. Independent Surveyors.
Ministerial Laws & Decisions

1. Decision of president of the United Arab Republic by the law number 167 of the year 1960 concerning the security, system and discipline in the ships.

2. Decision of Minister of War number 314 of 1960 concerning discipline of captains and individuals of the ship's crew.

3. A decision by the law number 97 of the year 1960 concerning safety of the ships.

4. Law number 97 of the year 1961 concerning the maritime casualties and maritime wreckage (79/61).

5. Ministerial decision (Ministry of War) number 726 of the year 1962, concerning the maritime wreckage.

6. The law number 25 of the year 1968, by issuance of the law of confirmation in the civil and commercial materials. The eighth chapter, article 135 to 162 concerning the experience.

7. Decision of president of the Republic number 72 of the year 1972, concerning prevention of contamination of sea's waters by oil.

8. The decree by the law number 96 of the year 1952 regarding organizing the experience infront of the jurisprudence authorities.
<table>
<thead>
<tr>
<th>Independent Surveyors</th>
<th>Ministry of Justice Surveyors</th>
<th>Exofficio Surveyors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enlisted in the surveyors' table which belongs to the competent court.</td>
<td>Appointed to the Surveyor's Office in the Ministry of Justice.</td>
<td>1. Surveyors of the Ports and Light Houses Administration.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Harbour Master.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Traffic Officer in the port.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Chairman of the Traffic Section in Suez Canal Authority and Traffic Officer in the Authority.</td>
</tr>
</tbody>
</table>
CHAPTER V

THE AUTHORITIES RESPONSIBLE FOR ANALYSIS OF THE MARITIME ACCIDENTS IN EGYPT

First: Port and Light Houses Administration

Second: Suez Canal Authority
The Authorities which are Responsible for Analysis of the Maritime Accidents in Egypt

First:

Ports and Light Houses Administration:

1. The Historical Backgrounds:

1.1 The history of the establishment of the Ports and Light Houses Administration (P & L.H.A.) goes back to a long time ago. It began to take the organized nature of the administration as from 1880 at which time the Egyptian ports had been developed. Many lighthouses and maritime marks have been constructed on the Egyptian shores in both Mediterranean Sea, Red Sea, and Suez Gulf with a view to increase the number of the ships which pass through the Egyptian territorial waters. This development took place because the opening of the Suez Canal led to the increase of the trade among European countries, India, and Eastern countries of Asia. The Headquarters is located in the harbour of Alexandria and according to these developments it was found necessary to establish branches to this Headquarters. These branches are in both harbours of Suez and Port Said. The specialization of the authority of these organizations include:

a. Ensuring safety of navigation in the Egyptian waters.

b. Administering the Egyptian ports:
   - Harbour of Alexandria.
   - Harbour of Port Said.
1.2 Moreover, from sometime ago the Administration was under the direct control of the Egyptian Ministry of War.

1.3 The consecutive decisions which determine specializations of the authorities were issued and the most important of them are as follows:

   a. Decision of the Minister of War, Number 3285, of the year 1960 concerning organizing the Ports and Light Houses Administration.

   b. Republican decision number 2062 of 1972 by changing affiliation of the Port and Light Houses Administration to Ministry of Transport.

   c. Many other decisions issued to construct independent authorities for the administration of the following ports:
      - Alexandria.
      - Port Said.
      - Suez and the small ports in the Red Sea and Suez Gulf, yet all the lighthouses belong to the administration.

2. In case of occurrence of a maritime casualty or accident, the specialization in accordance with the law number 97 of
the year 1960 concerning safety of the ships (articles number 18 and 22), and the law number 79 of the year 1961 (4) is held for the Ports and Light Houses Administration.

3. The ministerial decision number 31 of the year 1983, regarding the general specializations for the Ports and Light Houses Administration, determined the different sections which control the investigation of the accidents. These sections are as follows:

3.1 The Foreign Ships:

In the case that a foreign ship causes occurrence of a maritime accident (stranding, collision, pollution, etc.) in the Egyptian territorial waters, or on the Egyptian shores, the Public Division for the Legal Affairs will be in charge of hearing such violation and applies the rules and decisions which are stipulated in the law number 79 of the year 1961 which concerns the maritime casualties and the ship's wreck.

3.2 Ships Flying the Egyptian Flag:

The maritime legislations and investigations division which is under the General Administration for the Maritime Inspection is concerned with hearing the maritime accidents and casualties which occurred in the
Egyptian ships either in the territorial waters in the Egyptian ports and shores, or in the foreign ports and shores.

4. The general procedure in case of occurrence of a maritime casualty in the field of the Egyptian territorial waters is as follows:

4.1 The law number 79/71 defined the maritime casualty as any accident that occurs in the ships and leads to:

a. Wreckage of the ship, such as collision accident, inversion, explosion, etc.

b. Stranding and grounding.

c. The ship being in dangerous situation such as fire, shifting of cargoes, etc.

4.2 Notification of the accidents and casualties:

There are stations on the Egyptian shores which observe the Egyptian coasts and notify of the accidents or the casualties which they perceive, particularly in the limits of the big ports such as harbour of Port Said, Alexandria, and Suez. Yet the law number 79/61 provided that ships which pass through the Egyptian territorial waters must give a notification about any maritime accident or casualty which is observed by the ship's
captain. The notification must be submitted to the nearest port of the region of the accident or be sent by wireless communication to the competent administration (Ports and Light Houses Administration in Alexandria).

4.3 The procedures taken by the Port and Light Houses Administration are as follows:

a. At the very moment when the representatives (surveyors) of the Port and Light Houses Administration know that a maritime accident has occurred, they go to the place of the event and take all the possible steps to save lives. For this purpose they are entitled to take procedures which they see necessary to preserve the ship and its cargo from individuals.

b. Performing the primary inspection.

c. The Master of the afflicted ship must present a detailed report about the accident to the Ports and Light Houses Administration. This report must be accompanied by the official documents and papers which concern the ship and specially clarify what were on the ship from goods, passengers and crew. According to this report the necessary
minute will be made and the rights of the parties who are participated in the maritime journey (crew, passenger, owners of the goods, owners of the ship) will be guaranteed.

d. The Port and Light Houses Administration (the Legal Affairs Division) performs the investigation into the accident. First they question the person whom they recognize is the right one. The inquisition takes place after making him (her) swearing the legal oath whether this person is a member of the crew or others, provided that the investigation includes the following essential information:

- Ship's name and descriptions.
- Name of the ship's owner and lessee.
- Particulars about the commodities which are shipped on board the ship and names of their owners.
- Ports of shipping of the goods and ports of discharge.
- All procedures of the salvage which are performed to the ship and name of the authority who presented the salvage in details.
- Accident's reasons and the incentives which led to it.
- Anything else that may be useful to the investigation.
Furthermore, minutes of the investigation will be written in an original plus three copies.

e. If there is a suspicion concerning the fact that the accident (casualty) purposely occurred, then the Administration asks to arrest the ship's Master and his accomplices and they will be forwarded to the public prosecution to be submitted to the trial.

f. Recovery of the wreckages:
It is not permitted to extricate any maritime wreckage from any Egyptian Port and territorial water except by official permission from the Port and Light Houses Administration (P. & L.H.A.).

4.4 Procedures of investigation in the accident (casualty):

a. The notification of the accident will be handed over to the Administration.

b. The primary report by the representative of the Port and Light Houses Administration will be prepared.

c. A technical committee will be formed of three persons who are as follows:
   - Master Mariner
   - Marine Engineering Surveyor.
   - Legal representative of the Port and
The technical committee controls and takes the procedures of investigation as mentioned in item number 4.3 - c.

d. The Committee issues its decision, presenting it for the further decision to the Director General of the Port and Light Houses Administration, who in his turn will make the suitable decision in this concern, namely:

- In case of proving a technical mistake on the part of the Master or one of the crew's individuals it will be presented to the public prosecution to take the necessary procedure to present the person who was proved to be at fault to the trial.

- In case of not proving a technical mistake on the part of the Master or one of the crew's individuals, then the investigation will be preserved.

4.5 In the event that the ship is flying the Egyptian flag (Egyptian nationality), then in accordance with the law number 167 of 1960 the responsible person who is proved to have committed the technical mistake will be presented to the disciplinary council.
4.6 Disciplinary councils:

a. Disciplinary council.
b. Supreme disciplinary council.

a. Disciplinary Council:
The disciplinary council is concerned with hearing the technical mistake as determined by the investigating committee and defined in its decision.

Further, the decision of formation of the council is issued by the Vice Director of the Port and Light Houses Administration. This council consists of the following:

- Marine officer whose rank is not less than major - Chairman (Navy Officer)
- Member from state council - Member
- Member who represents the General Authority for the Maritime Transport Affairs - Member
- A man from the merchant navy whose rank is not less than the accused - Member

Provided that, it is not permitted to present the person at fault to the previous council until the investigation has been completely performed by the technical committee studying the accident, resulting in a decisive opinion which proves the technical mistake on the part of the accused.
Furthermore, the council is entitled to issue the following punishments:

- Preclusion from work in ships for a period which does not exceed six months.
- Delay the priority in the promotion.
- Demote the accused a degree which is less than his real degree.

Moreover, the council is not entitled to issue the decision to inflict the punishment without hearing the statement of the person at fault and defence. Therefore, a date will be fixed on which the accused attends the council to defend himself. In case of non-attendance of the accused after notifying him about the date, the council is entitled to issue the decision in absenteeism.

Further, the one who is judged in absenteeism has the right to challenge it by protesting against the decision of the disciplinary council and the same council hears the protest.

b. Supreme Disciplinary Council:

The one who is judged by the Disciplinary Council is entitled to complain about the decision. The act of injustice will be heard by a supreme disciplinary council, the formation of which will be
issued in each event separately by decision of
General Manager of the Port and Light Houses
Administration (P & L.H.A.) and this supreme
disciplinary council consists of:

- General Manager of the Port and Light Houses
  Administration or his deputy - Chairman.
- Member from state council whose degree is
  not less than vice of attorney general - Member.
- Member who represents the General Authority
  for the Maritime Transport and Affairs - Member.
- A man from the commercial navy of the occupa-
  tion of the accused whose rank is not less than
  the accused - Member.

Further, exemption of the supreme disciplinary
council is without the exemption of the discipli-
nary council (the first one). The verdicts of
this council are final and it is not permitted to
rehear these verdicts only by means of petition of
rehearing. They will only be reheard in case of
new factual evidences of papers in favour of the per-
son at fault which were not presented to the
investigator of the disciplinary council.

The seaman's passport of the accused will be sus-
pended while the decision for its cancellation
is issued by the competent council.
5. In the event of presenting the guilty party (who is proved to be at fault to the public prosecution, due to the fact that he has committed a felony or a misdemeanor stipulated in the law number 167 of 1960, or if the accident caused loss of lives or pollution in the maritime environment, then the prosecution perhaps give an order to form another technical committee consisting of the maritime surveyors or to mandate a maritime surveyor so as to declare a technical opinion about the accident.

6. When the Public prosecution decides to present the person who is responsible for the accident to the competent court in its circle of specialization where the accident occurred, then the judge may be provided with the opinions which are presented by the surveyors in the previous stages, or judges to summon maritime specialized surveyor. From the surveyors desk at the court an opinion could be expressed. From the surveyor's office in the Ministry of Justice, a judgement could be issued to form a new technical committee to express their opinion.

Moreover, in all the above mentioned cases, the surveyors who are directed to express their opinions must be well informed of the scientific and practical rules and principles to analyse the maritime accidents.

7. Conclusion:

From what was said under this section we come to this conclu-
sion that all the procedures of investigation and inspection about the accidents necessitates the existence of the men of high experience and justice in the maritime field so as to be reliable to execute and apply the numerous laws in this concern with a view to know the following:-

7.1 Reasons of the accident and the motives which lead to it.

7.2 Determine the responsible person or the one who caused occurrence of the accident and present him to the trial.

7.3 Determine the damages which are resulted from the accident.

7.4 Preserve rights of those who participated in the maritime journey (ship's owner, passengers, crew, owners of the goods).

7.5 Issue the recommendation which guarantee prevention of occurrence of repetition of the accident.

7.6 In the field of pollution accidents, there are two motives besides the ones mentioned above and they are as follows:-

a. Covering the civil responsibility about pollution accidents.
   - The person or organization responsible for paying fine in respect of pollution.
- The person or organization responsible for paying costs of the pollution damages.

b. Enforcement of the criminal law upon the person or organization which caused the pollution.

7.7 There are two types of pollution incident investigations for enforcement of the law:

a. To support the civil penalty action.

b. To support criminal action for non-notification.

Moreover, in all cases whether in the inspection, investigation, or disciplinary councils, the attendance of the individuals who are well informed of the scientific and legal system which must be followed in dealing with the maritime accidents is necessary.
PROCEDURES OF INVESTIGATION IN THE MARITIME CASUALTY WHICH ARE PERFORMED BY THE PORTS AND LIGHT HOUSES ADMINISTRATION

Marine Casualty

Receiving the primary notification about the accident

The preliminary report about the accident or the primary inspection which are performed by the representative of the Ports and Light Houses Administration

Decision of formation of the Technical Committee to perform investigation in the accident is issued by the Director General of the Ports and Light Houses Administration.

The Technical Committee is formed from: Captain, Marine engineer, Lawyer

Committee's decision is submitted to the Director General of the Ports and Light Houses Administration.

Egyptian ships only: Disciplinary Councils

Supreme Disciplinary Council

(Suspension or Revocation of Certificate)

Public Prosecution

Competent Court

Court of Appeal

Egyptian and foreign ships:

Archives
MARITIME CASUALTY

Investigation and Inspection

Surveyors of the Ports and Light Houses Administration

Exofficio Surveyors

Disciplinary Councils

Surveyors who are appointed in the disciplinary councils

Mandated from outside of the governmental administration.

Public Prosecution

Surveyors who are mandated to declare the opinion according to decision of the prosecution

Mandated from outside of the governmental Administration or from it.

The competent court

Surveyors who are mandated so as to declare the opinion in accordance with the court's judgment

Surveyors from the surveyors office in the Ministry of Justice

Surveyors from the table

Independent Surveyors
1. Introduction:

Suez Canal Authority is considered by the authorities all over the world for the peculiar and distinguished nature which it alone possesses since its establishment at the end of the past century. Bearing in mind the political situations which pertained at the time of its establishment and the nature of those of different nationalities who worked therein, it had its special law for supervision over navigational movements in the Canal. After nationalization of the Canal in 1956 it has had the Egyptian position, in accordance with the Egyptian legislation which is enforceable until now.

2. Passage through the navigational canals represents difficulties to those who work on the ships and navigation companies. This is due to the increase of intensity of the navigational movements at the inner and outer edges of the canals which during the passage increases the possibility of occurrence of accidents such as collision or stranding. Therefore, the administrations which supervise the work in these canals attempt to increase and promote the degree of safety of passage through these canals and their inner and outer areas by means of applying the following points:

a. Selection of the human elements having advanced efficiency, such as pilots who forward the ships, as well as the human elements in the administrations who ensure the safety of navigation.

b. Reduction of human errors.

c. Promotion of efficiency of navigational aids which are used by the
pilots and masters in navigating the ship through the canals.

d. Plan the inner and outer limits of the canals and limit the navigational routes of the ships so as to avoid stranding and collision accidents.

3. In addition, the administrations which supervise the work in the canals would increase the supporting facilities which are applied in preventing and treating the damages which result from occurrence of accidents. This is by finding quick and effective means of extinguishing fires, ready availability of tugboats to tow ships in case of stranding, and anti-pollution equipment.

4. The revenue from fees for use of the navigational canals represents a principal income to the country. In a country like Egypt the revenue of the Canal which annually amounts to about one billion U.S. dollars, certainly represents a principal element for the national revenue of the State. But there is still a hard equation between the present passage fees of ships and the extent to which increases are possible without forcing the traffic to use other routes due to unacceptably high Canal charges. The country has attempted to attract the largest number of ships to pass through its Canal so as to increase the revenue and this has been done through the following elements:

a. Increase element of safety for ships which pass through the Canal.

b. Fix the fees appropriate to the passage of the ships, bearing in mind what the market will bear.
5. In order to increase safety elements for ships which pass through the Canal, the administration of the Canal performs the following:

a. Selection of efficient personnel to administer the Canal and pilotage.

b. Providing principal equipments which are necessary to ensure the safety of passage:
   - Navigational Aids.
   - Extinguishing Equipment (Fire-fighting, boats, salvage boats, etc.)
   - Traffic Control Systems.

c. Utilizing experience gained from mistakes and maritime accidents occurring in the Canal to improve safety standard.

6. To utilize the maritime accidents which occur within the passage of the ships through the Canal, it is necessary to perform the investigation along with a complete and scientific analysis so as to issue the recommendations which concern prevention of repetition of such accidents. The general impression when an accident occurs during a passage of a ship through the Canal is that it is due directly to short-comings in its administration and it is a kind of criticism which might disturb the peaceful passage of the ship through the Canal and reduce the number of passing ships and subsequently reduce revenue.

7. The kind of accidents which commonly take place in the canals are mostly collisions and strandings. These are due to many reasons, including the nature of the area through which the ship passes
which confines its ability to make the necessary manoeuvres so as to avoid an accident.

8. Suez Canal is considered as the biggest passage way in the world by the number of the ships which pass through it yearly (22500 ships), types of ships, and types of cargoes. Therefore, the safety elements must be to the maximum extent possible, especially for the giant ships which pass, from petroleum carriers upto 450,000 tons in ballast or cargo carriers amounted to 300,000 tons laden.

9. The transit Department in Suez Canal is concerned with collection of data on occurrence of the accidents. Then the Investigation Division performs the investigation which concerns maritime accidents occurring within the Canal. If it occurs in the area outside the navigational passage way of the Canal, then it will be the authority of the Egyptian Ports and Light Houses Administration. There is an inquiry officer in all ports, Port Said, El-Ismailia, and Suez, who goes to the scene immediately after occurrence of an accident so as to collect the necessary data in accordance with a format which is allocated to such accidents (See Appendix II). Connected to this administration, there is a rescue team which is always alert with a view to take the necessary procedures against the damages which have resulted from the accidents such as fire fighting boats in case of fire and anti-pollution equipments in case of occurrence of oil spillage.

The Maritime Accidents in The Canals:

1. The kinds of maritime accidents in the canals are widely varied and
resemble those accidents which occur in the open sea. With respect to their occurrence inside the Canals it is the responsibility of the Canal Administration to take all possible precautions to prevent their occurrences. Types of accidents include:

a. Stranding
b. Collision
c. Fire

2. Stranding and Collision:

The reasons which bring about stranding and collision are different from ship to ship and these reasons have been previously clarified in detail. Yet they differ in the canals and passage ways in another sense. Further, the difference of the canal's bottom with the ship's hull may bring about a sudden declination of the ship which brings about the collision accident or the grounding which is neither the master's nor the pilot's fault. Analysis of the real reasons of the accidents in the canals may be different from the reasons of the accidents which occur in the open sea, so it is possible to add another factor, namely topography of the canal's form.

Accordingly, if it is clarified that in a limited area of the canal ship steering or deviation of the ships courses therein is difficult, the reason for this may be due to the inconsistency of the form of the bottom with form of the ship's hull, for example. Therefore, the canal's administration were forced to rectify the canal's form so as to suit form of the passing ships' hulls and also their drafts.
3. The Transit Department in Suez Canal Authority, in cooperation with the Research Center in the Authority, performs the studies which concern analysis of the maritime accidents so as to prove the effective and direct reason and find out if it is due to deviation of the ship because of the canal's form.

4. The Suez Canal Authority made a questionnaire for the master of ships which pass through the Canal so as to ask them about the most important areas in the Canal which represent a hazard against navigational movements, likely to bring about an accident therein (collision or stranding).

5. The Authority prepared a data formal showing information to be collected during accident investigation by competent inquiry officers for the purpose of guaranteeing collection of the greatest possible amount of information by the right method.

6. We shall present some data concerning maritime accident in the Suez Canal taken from official documents of the Canal Authority and not previously published. Taking into consideration that the word "collision accident" includes any contact between two ships or friction between a ship's body and the wharf or a buoy and not a serous casualty, no serious casualties have occurred inside the Canal itself. However, in the entry to the Canal from the direction of Port Said the collision accident of the ship named GARNET against the ship named MOLANVENTURE occurred, which has previously been mentioned.
### SEA CANALS MONTHLY TRAFFIC OVERVIEW

**A. Shipping Traffic**

<table>
<thead>
<tr>
<th>Year/Month</th>
<th>Panama Canal</th>
<th>Suez Canal</th>
<th>Kiel Canal</th>
<th>St. Lawrence Seaway</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Trans.</td>
<td>Net Tonnage</td>
<td>Southbound</td>
<td>Northbound</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No. of Trans.</td>
<td>Net Tonnage</td>
</tr>
<tr>
<td>1985</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>1009</td>
<td>14105</td>
<td>910</td>
<td>16522</td>
</tr>
<tr>
<td>April</td>
<td>971</td>
<td>13860</td>
<td>920</td>
<td>15509</td>
</tr>
<tr>
<td>May</td>
<td>1033</td>
<td>15027</td>
<td>904</td>
<td>14633</td>
</tr>
<tr>
<td>June</td>
<td>971</td>
<td>13948</td>
<td>788</td>
<td>13854</td>
</tr>
<tr>
<td>July</td>
<td>993</td>
<td>14982</td>
<td>889</td>
<td>15692</td>
</tr>
<tr>
<td>August</td>
<td>947</td>
<td>14415</td>
<td>830</td>
<td>15059</td>
</tr>
<tr>
<td>Sept.</td>
<td>928</td>
<td>13858</td>
<td>873</td>
<td>15350</td>
</tr>
<tr>
<td>Oct.</td>
<td>1023</td>
<td>15755</td>
<td>858</td>
<td>16618</td>
</tr>
<tr>
<td>Nov.</td>
<td>999</td>
<td>15501</td>
<td>824</td>
<td>16111</td>
</tr>
<tr>
<td>Dec.</td>
<td>975</td>
<td>15107</td>
<td>864</td>
<td>17952</td>
</tr>
<tr>
<td>1986</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>1021</td>
<td>15310</td>
<td>830</td>
<td>16737</td>
</tr>
<tr>
<td>Feb.</td>
<td>880</td>
<td>13076</td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>1057</td>
<td>16149</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
B. Goods Traffic

<table>
<thead>
<tr>
<th>Year/Month</th>
<th>Panama Canal</th>
<th>Suez Canal</th>
<th>Kiel Canal</th>
<th>St. Lawrence Seaway</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>East-bound</td>
<td>West-bound</td>
<td>South-bound</td>
<td>North-bound</td>
</tr>
<tr>
<td>1985</td>
<td></td>
<td></td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>March</td>
<td>5019</td>
<td>5502</td>
<td>10521</td>
<td>9109</td>
</tr>
<tr>
<td>April</td>
<td>5290</td>
<td>5180</td>
<td>10470</td>
<td>9548</td>
</tr>
<tr>
<td>May</td>
<td>4652</td>
<td>5857</td>
<td>10509</td>
<td>9414</td>
</tr>
<tr>
<td>June</td>
<td>4756</td>
<td>5248</td>
<td>10004</td>
<td>8641</td>
</tr>
<tr>
<td>July</td>
<td>5289</td>
<td>5865</td>
<td>11154</td>
<td>10208</td>
</tr>
<tr>
<td>August</td>
<td>4918</td>
<td>5510</td>
<td>10428</td>
<td>8651</td>
</tr>
<tr>
<td>September</td>
<td>4892</td>
<td>5706</td>
<td>10598</td>
<td>8253</td>
</tr>
<tr>
<td>October</td>
<td>5309</td>
<td>5957</td>
<td>11266</td>
<td>8729</td>
</tr>
<tr>
<td>November</td>
<td>5474</td>
<td>5472</td>
<td>10946</td>
<td>7847</td>
</tr>
<tr>
<td>December</td>
<td>4774</td>
<td>5768</td>
<td>10542</td>
<td>8236</td>
</tr>
<tr>
<td>1986</td>
<td></td>
<td></td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>January</td>
<td>4919</td>
<td>5664</td>
<td>10583</td>
<td>7873</td>
</tr>
<tr>
<td>February</td>
<td>4412</td>
<td>4510</td>
<td>8922</td>
<td>1711</td>
</tr>
<tr>
<td>March</td>
<td>5331</td>
<td>5508</td>
<td>10839</td>
<td>1639</td>
</tr>
</tbody>
</table>

Source: ISL BREMEN 1986, based on data from Panama Canal Commission; Suez Canal Authority; Der Bundesminister für Verkehr, Abt. Seeverkehr; St. Lawrence Seaway Authority.
Shipping and goods traffic 1936-1983.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Net tonnage (1,000 tons)</th>
<th>Year</th>
<th>Northbound</th>
<th>Southbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>1936</td>
<td>5,877</td>
<td>32,379</td>
<td>1936</td>
<td>16,727</td>
<td>8,829</td>
</tr>
<tr>
<td>1940</td>
<td>2,589</td>
<td>13,536</td>
<td>1939</td>
<td>17,161</td>
<td>7,518</td>
</tr>
<tr>
<td>1945</td>
<td>4,206</td>
<td>25,065</td>
<td>1946</td>
<td>15,931</td>
<td>5,995</td>
</tr>
<tr>
<td>1950</td>
<td>11,751</td>
<td>81,796</td>
<td>1950</td>
<td>60,468</td>
<td>12,141</td>
</tr>
<tr>
<td>1955</td>
<td>14,166</td>
<td>115,746</td>
<td>1955</td>
<td>87,426</td>
<td>20,080</td>
</tr>
<tr>
<td>1960</td>
<td>18,734</td>
<td>185,322</td>
<td>1960</td>
<td>139,630</td>
<td>29,253</td>
</tr>
<tr>
<td>1965</td>
<td>20,289</td>
<td>246,817</td>
<td>1965</td>
<td>183,441</td>
<td>42,001</td>
</tr>
<tr>
<td>1975</td>
<td>5,579</td>
<td>50,441</td>
<td>1975</td>
<td>18,480</td>
<td>19,140</td>
</tr>
<tr>
<td>1980</td>
<td>20,795</td>
<td>281,305</td>
<td>1980</td>
<td>86,547</td>
<td>89,729</td>
</tr>
<tr>
<td>1981</td>
<td>21,577</td>
<td>347,356</td>
<td>1981</td>
<td>93,896</td>
<td>102,532</td>
</tr>
<tr>
<td>1982</td>
<td>22,545</td>
<td>363,538</td>
<td>1982</td>
<td>124,805</td>
<td>106,588</td>
</tr>
<tr>
<td>1983</td>
<td>22,224</td>
<td>378,226</td>
<td>1983</td>
<td>141,002</td>
<td>115,703</td>
</tr>
</tbody>
</table>

SUEZ CANAL

Shipping traffic by type of vessel 1983.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Net tonnage (1000 t.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>North/South</td>
<td>South/North</td>
</tr>
<tr>
<td>LADEN VESSEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tankers</td>
<td>834</td>
<td>1,246</td>
</tr>
<tr>
<td>Bulk carriers</td>
<td>1,629</td>
<td>1,037</td>
</tr>
<tr>
<td>Combined carriers</td>
<td>63</td>
<td>179</td>
</tr>
<tr>
<td>General cargo</td>
<td>4,573</td>
<td>2,746</td>
</tr>
<tr>
<td>Container</td>
<td>1,124</td>
<td>811</td>
</tr>
<tr>
<td>Lash ships</td>
<td>45</td>
<td>44</td>
</tr>
<tr>
<td>Ro/Ro</td>
<td>813</td>
<td>382</td>
</tr>
<tr>
<td>Car carriers</td>
<td>123</td>
<td>342</td>
</tr>
<tr>
<td>Passengers</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>War ships</td>
<td>111</td>
<td>71</td>
</tr>
<tr>
<td>Others</td>
<td>451</td>
<td>243</td>
</tr>
<tr>
<td>TOTAL</td>
<td>9,792</td>
<td>7,126</td>
</tr>
</tbody>
</table>

IN BALLAST VESSELS

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Net tonnage (1000 t.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>North/South</td>
<td>South/North</td>
</tr>
<tr>
<td>Tankers</td>
<td>1,092</td>
<td>430</td>
</tr>
<tr>
<td>Bulk carriers</td>
<td>105</td>
<td>694</td>
</tr>
<tr>
<td>Combined carriers</td>
<td>118</td>
<td>34</td>
</tr>
<tr>
<td>General Cargo</td>
<td>55</td>
<td>1,536</td>
</tr>
<tr>
<td>Containers</td>
<td>4</td>
<td>293</td>
</tr>
<tr>
<td>Lash ships</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>
Shipping traffic by type of vessel 1983. (Cont'd.)

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Net tonnage (1000 t.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>North/South</td>
<td>South/North</td>
</tr>
<tr>
<td>Ro/Ro</td>
<td>24</td>
<td>432</td>
</tr>
<tr>
<td>Car carriers</td>
<td>121</td>
<td>15</td>
</tr>
<tr>
<td>Passengers</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Others</td>
<td>116</td>
<td>206</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,645</td>
<td>3,661</td>
</tr>
</tbody>
</table>

GRAND TOTAL

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Net tonnage (1000 t.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>11,437</td>
<td>10,787 22,224</td>
</tr>
<tr>
<td>1982</td>
<td>11,552</td>
<td>10,993 22,545</td>
</tr>
<tr>
<td>1981</td>
<td>11,163</td>
<td>10,414 21,577</td>
</tr>
<tr>
<td>1980</td>
<td>10,723</td>
<td>10,072 20,795</td>
</tr>
</tbody>
</table>

Source: Shipping Statistics Year Book 1984, p. 430.  
Institute of Shipping Economics Bremen 1984.
Locational Changes in Risk Level

The following graphics show the locational changes in risk level in the three periods, i.e. the period from 1976 to 1980, from 1981 to 1982 and the total period from 1976 to 1982, and compare the risk levels in the period from 1976 to 1980 and the period from 1981 to 1982 by location.

It may be seen that the collision cases in the period from 1976 to 1980 are highly concentrated in Port Said with a much smaller peak in El Kabrit, but those in other areas are more or less on the same level. Grounding cases have three peaks in El Ballah, Lake Timsah and El Kabrit.
Collisions

- Day
- Unknown
- Night

Number of accidents

Place of accidents

1 to 12

Groundings

- Day
- Unknown
- Night

1. Port Said and Waiting Area (~ Km 2)
2. Port Said Bypass (Km 2 ~ 20)
3. Km 20 ~ 50
4. El Ballah (Km 50 ~ 62)
5. Km 62 ~ 73
6. Lake Timsah (Km 73 ~ 82)
7. Km 82 ~ 94
8. Great Bitter Lake (Km 94 ~ 116)
9. Little Bitter Lake (Km 116 ~ 134)
10. Km 134 ~ 155
11. Km 155 ~ 162
12. Suez and Waiting Area
Comparison of Risk Levels in Various Canals

<table>
<thead>
<tr>
<th>Name of Canal</th>
<th>Number of Transit Vessels</th>
<th>Number of Accidents</th>
<th>Length of Canal (Km.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suez Canal (1982)</td>
<td>22,545</td>
<td>174</td>
<td>162</td>
</tr>
<tr>
<td>Kiel Canal (1982)</td>
<td>64,782</td>
<td>265</td>
<td>99</td>
</tr>
<tr>
<td>Panama Canal (1982)</td>
<td>14,009</td>
<td>71</td>
<td>82</td>
</tr>
<tr>
<td>Average</td>
<td>33,778</td>
<td>170</td>
<td>114</td>
</tr>
</tbody>
</table>

Note: These data were compiled under various systems. Statistical comparison of these data on a compatible basis involves considerable difficulties.

Source: Suez Canal Authority: "Study on the Safety Improvements of the Suez Canal - August 1985, p. 350" (not published)
This research center is located in El-Ismailiyia city, near the headquarters of the Suez Canal Authority.

Persons of scientific and practical capabilities work in this center.

The center is concerned with performing research which concerns the navigational passageway of the Canal. This center includes many laboratories which perform the studies required in this research.

Firstly: Canal's Laboratory (Towing Tank)

1. Completion of the research about the influence of one ship upon a navigational passageway, on its passing through the pivot of the passageway or far from the pivot (this is by changing speed, section, draft, etc.).

2. A complete study about the passing of two ships at the same time through the Canal; either each side of a submerged bank (designed to limit the dual effects of the propellers underwater) or through two passages which run either side of a natural island.

3. Influence of tide currents upon these studies, particularly in the southern sector of the Canal.

4. Study of other new matters relating to navigation in the Canal.
Secondly: Seaports Laboratory

1. The Main Basin of the Seaports:
   a. Studies about the different seaports. These studies give priority to Port Said and Suez, then to any other seaport on application.
   b. Studies about straits between the Mediterranean Sea and any lake and studying the influence of the coastal currents and waves upon the brim of the entry.

2. Waves and Seaports Basin:
   a. Studying wave action upon the shore lines, and influence of the lateral currents in changing the form and balance of the shore.
   b. Studying the different forms of slope of the banks and influences of the waves, on the shore line, and connecting this study with an attempt to represent the waves of the ships which pass through the Canal and their influence upon the forms of slope of the banks.
   c. A primary study about the seaport in general.

3. Course of the Waves:
   a. Studying the various forms of the waves and influence of each of them upon water movement.
   b. Studying the different methods to absorb the waves' energy as well as the laws of refraction.
c. Studying the breakwaters in general.

d. Studying movement of the materials under the influence of the waves and currents.

Thirdly: Soil Mechanics Laboratory

1. Studying and determining the slopes of the Canal so as to make a design for the various sections alongside the Canal.

2. Studying the best kinds of slopes of banks and the suitable water area between the two banks, as well as studying the berth construction by studying the load-bearing ability of the soil, its friction angle, coefficient of trim and friction and quantity of waters which exist therein.

3. Determining the soil's tension so as to study the foundations of the Canal's installations.

4. Making a complete geological map of the Canal region.

5. Cooperation with other research institutions if requested.

Fourthly: Materials Laboratory

1. Studying resistance of the materials used in the installation and belong to the Canal such as the reinforced concretes, rubblestones, tiles, woods, ropes, metallic cables, iron chains, angles and
metallic sheets, etc.

2. Studying means of amelioration and designing the various mixtures for concrete, whether by use of limestone, pebbles, and normal or reinforced cement, and whether by use of fresh or salt water.

Furthermore, it might be said that the above mentioned points are the most important subjects of the research performed by this center, but other factors may arise to require the performance of new research either for Suez Canal Authority or for any other foreign authority.
CHAPTER VI

ASPECTS OF POINTS OF WEAKNESS OF THE INQUIRY AND INVESTIGATION SYSTEM IN EGYPT
Aspects of Points of Weakness in the System of Investigation
and Analysis of the Maritime Accidents in Present Use

Based on what has been explained in the previous chapter and with respect to the considerable responsibilities assigned by law to the Port and Light Houses Administration concerning investigation into maritime accidents, in the period between 15 January 1986 to 5 February 1986, the researcher performed many field visits to the Ports and Light Houses Administration, particularly in the departments and divisions which are responsible for maritime casualties and accidents as follows:

1. The Public Division for Legal Affairs.

2. Department of maritime casualties and ships' wreckage (concerned with recovery of wreckage).

3. Maritime legislation and investigations department (Maritime Inspection Administration).

1. The Public Division for Legal Affairs:

This Division has authority for investigation of maritime casualties involving foreign ships. It also follows up the findings of investigation committees and refers serious violations to the public prosecution.

2. The Maritime Casualties and Ships' Wreckage Department:

This department is concerned with execution of the procedures concerned with safeguarding the ships' wreckage and takes necessary procedures for its removal in accordance with the laws and regulations concerned (4).
3. **Maritime Legislation and Investigations Department:**

(The Maritime Inspectorate)

In the field of the maritime casualties and accidents this department is concerned with the following:-

3.1 Performing investigation into violations which are committed by individual of crew members of Egyptian ships.

3.2 Performing investigation into technical mistakes which result in the occurrence of maritime casualties.

3.3 Representing the Administration in front of the judicial authorities and surveyors of the Ministry of Justice.

3.4 Organizing a register of investigations and files of documents relating thereto.

3.5 Preparing necessary procedures and forming committees of investigation and disciplinary councils in accordance with the requirements of law.

3.6 Following up execution of decisions of the disciplinary council and investigation of appeals against these decisions.

4. **Types of Maritime Accidents and Casualties in the Competent Departments:**

We can classify the maritime accidents which are lodged with the administrations as follows:-

4.1 **Serious Maritime Casualties:**

Serious maritime casualty applies to accidents which bring about
complete destruction of the ship to the extent of its conversion into wreckage considered as a total loss, or constructive total loss. Such casualties may also bring about serious harm to the persons or board, whether crew or passengers. Following are examples of serious maritime casualties:

- Collision accident resulting to in sinking of a vessel.
- Stranding accident which can not be rectified.
- Explosion accident in the machinery space resulting in division and sinking of the ship.

4.2 Marine Casualties:

Such accidents lead to the occurrence of serious harm and damage to the ship's hull and machinery or in the maritime environment (pollution of the sea). But in this situation the ship is not considered as it is not considered to be a total loss, or in case of occurrence of harm to the lives of the individuals, it is less than five persons.

Examples: - Rectification of a stranded ship.
- Performance of emergency reparations in a ship after collision accident.

4.3 Light Marine Accidents:

The light marine accident applies to any friction of material standing in a ship's body against another ship or floating maritime installation without occurrence of serious damages.
5. **Serious Maritime Casualties in Egypt:**

The number of serious maritime casualties in the Egyptian territorial waters is very few and during the last five years (1980-1985) there has only been one maritime casualty, namely the sinking of the ship GARNET in the Port Said anchorage area as a result of a collision accident against the ship MOLANVENTURE.

On 9.12.1981 the ship GARNET collided during sailing in the outer anchorage area of the Port Said port with the Liberian ship MOLANVENTURE. This collision affected the machinery space of the ship GARNET caused imbalance resulting in sinking.

**Ship's title:** GARNET  
**Nationality:** PANAMANIAN  
**Type:** General Cargo  
**D.W.T.:** 11 846

**Collided with:**

**Ship's title:** MOLANVENTURE  
**Nationality:** Liberian (Monrovia)  
**Type:** M. Tanker (Oil Chemical)  
**D.W.T.:** 24 243  
**Owner:** New Providence Tanker Corp.  
**Date:** 9.12.1981

**The Accident:**

During the movement of both ships in the outeranchorage area of Port Said, the Liberian ship MOLANVENTURE deviated from its route as
a result of shutting-off its engines and steering gears, and this shutting-off brought about the collision of the bow of this ship against the middle of the ship GARNET. This accident resulted in a big opening in the side of the ship GARNET. From this opening, water rapidly entered into the ship causing the ship to lose its balance and sink in the anchorage area.

Cargo of the Ship GARNET:

This ship was carrying general cargoes, chemical substances, and a small quantity of radiant substances.

Damages and Harm:

1. Sinking of the ship GARNET which was considered totally lost and became wreckage.

2. Occurrence of pollution in the maritime environment as a result of the leakage of the chemical substances into the sea water.

Procedure of Investigation:

1. The ship was inspected by the competent authorities (Port and Light Houses Administration) as well as by another action group from Suez Canal Authority.

2. A Technical Committee consisting of three members was formed to study the accident with a view to ascertain:
   - The reasons for the accident.
   - Whether the Master of the ship MOLARVENTURE intended purposely to collide against the ship GARNET.
   - Responsibility for the error.
3. Technical experts who are specialized in chemicals were mandated in order to know the extent of influence of the spread of the chemical substances in the sea and their influence upon the fish stocks.

4. Experts were mandated to discover the radiant substance and to clarify its influence.

5. Information was obtained from documents, certificates and logbooks of the ships.

6. The statements of the captains and some individuals of crew of both ships were heard.

Finally, the Committee concluded that there was no intention from the Master of the ship MOLARVENTURE to collide against the ship GARNET, and therefore he was not presented to trial. No text was formulated to organize or improve efficiency of sailing and navigation in the anchorage area, in order to prevent repetition of the occurrence of such accidents.

By comparison pursuant to the procedures and the decision of the Committee (report about some other accidents) we see that the Committee ought to issue its recommendations which increase ascertainament of the navigation's safety.

Remarks:-

The appropriate committee studies maritime accidents in the United States (U.S.C.G.) by presenting recommendations after analysing the results of investigation in the accident and forwarding them to:
1. Navigation companies (especially with a view to promote efficiency of the officers and engineers on the ship).

2. The administration which supervises safety of the ships.

3. Classification societies.

4. The administrations which are specialized in the activities of land transport, concerning the commodities and manner of packing.

Manner and Procedures of the Work:

After gaining knowledge through studying a number of cases of maritime accidents, it is possible to formulate the procedures which are performed by the department as follows:

1. Receiving the notification from the responsible committee and advising the maritime administration and the administration which is concerned with the investigations.

2. Notifying the police station in the area of which the accident has occurred.

3. Forming a Technical Committee with a view to study the accident.

4. Inspection of the accident by the Committee if it is possible.

5. Summoning the Master and some individuals of the crew and witnesses to receive their statements about the accident.

6. Acquiring information from the official registers (logbooks) of the ship and its documents.

7. Gaining knowledge on the sea protest.
6. **Marine Casualties in Egypt:**

Marine casualties are accidents such as stranding and fire to an extent where it is possible to save the ship.

The following is the specification of the casualty of the ship SALAH-EL-DEIN:

**The Accident:**

A fire kindled in the Egyptian ship SALAH-EL-DEIN in the anchorage area of Alexandria port.

**Ship's title:** SALAH-EL-DEIN

**Its Type:** General Cargoes

**Cargo:** General Cargoes and some dangerous cargo.

**The Owners:** Egypt Navigation Company

**Nationality:** Egyptian

**Place of Accident:** Anchorage area of Alexandria port.

**Date:** 18.3.1984

**Cargo on Board:**

General cargoes plus some dangerous cargoes which were shipped under deck, in the tween deck hatch No. 1.

(150 tons of hydrogen-peroxide).
Damages:

Damages occurred in the ship's hatches and in a part of the constructions. In accordance with the report, the losses were evaluated at millions of dollars.

Pursuance of the Investigation:

After arrival of the notification about occurrence of the accident, a Technical Committee was formed of:

1. Maritime Colonel. Chairman
2. Legal Member.
3. Technician Engineer from the Port and Light Houses Administration. Member.

The aforementioned committee acquired knowledge of:

2. The sea protest.
3. Report about efficiency of the fire extinguishers in the ship.
4. Report of damages from Lloyd's Authority.
5. Report from the navigation company.
6. Ship's Master, the duty deck officer, engineer on duty, and some individuals of the crew were summoned and their statements were taken.
7. Information on the general rules which concern shipping of dangerous goods was obtained.

Committee's Decision:

The Committee's decision did not confirm a technical mistake on the part of the Master of the ship or an individual from the crew and it ended
with non-realization of the direct reason of the accident.

* The Committee did not issue any recommendations concerning this accident.

**Grounding Accident of the Egyptian Ship SAKARA:**

- **Ship's title:** SAKARA
- **Nationality:** Egyptian
- **Type:** Bulk Carrier
- **Owner:** Misr Shipping Company
- **Date:** 11.9.1985
- **Movement:** To transfer the ship from the anchorage area of Suez Port to Adabia Port.
- **Guide:** In existence of Pilot Board.

**The Accident:**

During transfer of the ship SAKARA from the anchorage area of Suez Port toward Adabia Port, the ship's bow suddenly stranded in the "ATKA" Reeves Area despite the fact that the ship was sailing in the navigational passageway which is limited in accordance with the navigational chart.

**Pursuance of Procedures:**

Immediately after the notification was received, a Technical Committee was formed comprising a Master Mariner (as chairman), and two members, an engineer expert from the Marine Inspection Department which belongs to the Port and Light Houses Administration of Alexandria, and a legal member.
The Committee got the following information:

1. Official logbook.
3. Chief Officer's report.
5. Sketch to perform sounding around the ship.
6. The navigational chart.
7. Pilot's report.
8. The master and chief officer were summoned and interrogated.

Committee's Decision:

The Committee proved that the actual depth of the sea water at the time of stranding was less than the depth which was written on the chart, and this was due to the following:

There was a development and deepening operation in the Adabia Port which is located in the South anchorage area of Suez Port, and the dredgers which are responsible for the purification operation threw residuals of purification in close and not yet deepened areas including the area in which the ship stranded. This made the depth of water in this area different from the depth which is written on the chart.

Therefore, the Committee decided that there was no responsibility on the ship's captain or individuals in the crew.

Recommendations:

The Committee issued recommendations to the general authority of the
Red Sea and Suez Ports with a view to hasten purification of the location in which the ship stranded and return the navigational passage way to the depth which is indicated on the chart, as soon as possible.

7. **Light Marine Accidents in Egypt:**

Light marine accidents as previously indicated are frictions of two ships against each other, or light collisions. These accidents frequently occur in Alexandria Port especially in winter season because of the fluctuations of weather conditions and the resultant change in locations of the ships in the inside anchorage. Also friction of the ship inside the ports in general occurs in the wharf on berthing or leaving the wharf. The competent administrations are requested to present a technical report about the accidents and this is performed in Alexandria Port by representatives of the Port and Light Houses Administration and in the subordinate ports, Suez and Port Said it is performed by the representative of the Administration who works in the subordinate ports.

8. **Determination of Points of Weakness:**

After studying many marine accident reports on different incidents, and getting knowledge of investigation minutes, reports of the committees, and their decisions and after making comparisons between them and some other reports which resemble them and are performed by the U.S. Coast Guard, the researcher concluded the following:

a. It is incontrovertible in the field of maritime accidents, that maritime accidents are rarely similar all over the world. As has been said, they are like fingerprints which do not resemble each other; yet the comparison will be in mood of action, method
of investigation, the final decisions, the recommendations, and the right scientific analysis for the causes of the accident.

b. It is noticed that the committees which are formed in all maritime accidents have exerted an effort in studying the accident so as to know its causes and the person who brought it about, as well as in formulation of the final decision, in the right legal formulation, and recording of the reasons which led to issuance of the decision.

c. The committee formed to study the accident, in performing the investigation, depends only on the experience of its members. Therefore, the differences which appeared in method of action and decision of the committees was because of the difference of experience of members of the committees. After studying many reports of accidents, I found out that only a few of the committees issued their recommendations in a manner designed to avoid the occurrence of the accidents in the future, as in report of accident of the Egyptian ship SAKARA.

d. Detailed rules were not written, recorded and kept about pursuance of procedures so as to resort to them in each different kind of the maritime accidents.

e. There was not any kind of format of marine casualties reports to cover the principal information for the work of the committees later on, but there was a marine casualties report which has been used since many years ago, particularly in cases of stranding casualties. However, they neglect to use it, even though it contains many principal information which it is necessary to collect.
f. There is no standard marine casualties report which contains the principal questions which must be put forward to the master and individuals of the crew in each different accident case and which guarantees the minimum information which must be included in the investigation, then the special questions which concern each accident separately, but the investigation questions are left to the experience of the committee members. So there are committees which are expatiated in forwarding questions to the captains and individuals of the crew and some of them summarized these questions completely.

g. There is not any format to which it can resort on performing procedure of inspection. (Checklist)

h. In most final reports of the accidents the committees resorted to prove existence or non-existence of a technical mistake on the part of the Master and individuals of the crew, and completely disregarded performing an analysis about the accident so that it would be possible to refer to and utilize it in the future.

i. There is a sharp lack of masters who assume chairmanship of works of the committees. All of them are mandated and this dues to non-existence of appointed captains in the Port and Light Houses Administration since a long period ago. This is due to national and governmental reasons, namely low wages of government employees in comparison with other free enterprise. This has led to the departure of the qualified persons to private organizations in other places. So the problem is not the lack of the scientific and practical efficiencies in Egypt but it is the dominant circumstance; the connection of chairman of the committees is ended immediately after termination of investigations.
j. The number of certified investigators in administration of investigations is low in proportion to the amount of work directed to them. In addition to the fact that the principal member in the committee is mandated, so the period of work of investigation committees is elongated.

k. Most of the technician members (the engineers) who work in the maritime inspection administration lack the practical experience in the field of the sea (on board ship). This is due to the fact that the requirements of appointment are limited to bachelor of engineering certificate and ships architecture section, so they need a scientific and practical study on the method of performing of investigations and analysis of the maritime accidents.

l. There are no committees to perform investigation into maritime pollution accidents. This is despite the existence of the permanent committee to contend with pollution and work to prevent pollution of the sea water by oil. Also the existence of the legislation which concerns pollution of sea water by oil and determines the civil and criminal responsibility over the person who commits the accident and is applied on both captain of the ship and its owner when they violate judgements of the law or the international treaties which present pollution of sea water by oil.

m. There is neither means or method which is followed to inform the workers at sea, either the crew members or the masters and officers, about the mistake which has brought about occurrence of accidents, and how to avoid them. Further, the Port and Light Houses Administration and the Maritime Inspection Section, did not issue any leaflets or periodic pamphlets to Egyptian ships in order to give
allusions about the accidents which have occurred, the reasons for them, and how to avoid occurrence of such accidents in the future.
CHAPTER VII

THE ROLE OF MARITIME ACADEMY (AMTA)

First: A Draft Proposal for Marine Casualty Investigation Course.

Second: A New Role for the Maritime Research and Consultancy Center. (MRCC) - (AMTA)
First:

A

DRAFT PROPOSAL

FOR

MARINE CASUALTY INVESTIGATION

COURSE
Reasons which led to making a course to analyse maritime accidents:-

General:-

Since the beginning of the 1970s, a splendid development has occurred in the field of maritime sciences. This development related to the efficiency as well as to ships' design, as a result of this development, the ships' sizes have increased surprisingly, particularly the crude oil carriers. On the other hand, new types of ships in large sizes have been appeared such as gas carriers, chemical carriers, and different types of RO/RO ships, besides the gigantic container ships, and lash vessels.

This development in style of ship building and naval architecture was the beginning of change in the levels of risk and to verify the marine accidents on one hand and on the other hand pollution damages began to increase progressively. The accident of the following carriers were of this nature:-

- Torry-Canyon
- Amoco Cadiz
- Argo Merchant

At this point the world began to hear about sinking of the ships within a very short time such as the sinking of a RO/RO ship within two minutes, Jolly Azzurro (1978), Collo (1980), European Gateway (1983), and Mont Louis (1984), and some ships began to disappear completely without the reasons leading to these incidents becoming known. Among ships which have been lost following a shift of cargo are the Espresso Sardegne (1973), Zenobia (1980), and Mekhanik Tarasov (1982).

Further, it should be said that from the beginning of the 1970s until now an intellectual explosion has occurred in the field of maritime sciences. Besides, the variety of the international con-
ventions in the maritime field during this period of sixteen years (1970-1986) is also remarkable. During this period a large number of conventions have been concluded and many amendments have been performed such as:-


2. **Convention on the International Regulations for Preventing of Collisions at Sea, 1972 (COLREG)** (with Amendment of 1981)


The International Conventions for the Safety of Life at Sea, 1974 and 1978 Protocol and the International Convention for the Prevention of Pollution from Ships, 1973 with the 1978 Protocol. MARPOL 1973/78 and the relevant Amendment determined remarks of the ship's architecture, specially the tankers and how to avoid hazards of pollution from bulk chemical and petroleum carriers, etc. This matter is still, up to now, widely studied and discussed.

However, by referring to the marine survey we come to the point that those who are prepared to take over as maritime surveyors have two alternatives which are as follows:-

1. Free study (reading and study of new conventions);
2. Official study through maritime academies (marine casualty investigation course).
1. **Study's Objective:**

The objective of this study is teaching the following elements to the masters and engineers who actually work or shall work in the maritime field as marine experts. They will also be given the relevant training in the meantime.

- Using the scientific and technical approaches for marine casualty
- Investigation by studying the technical basis and fundamentals of hazards of pollution from ships.
- Function of the safety and fire equipment (in accordance with the new amendments.
- Applying scientific methods to prevent movement of heavy goods in ships.
- The scientific and practical method to perform investigation and analysis in maritime accidents so as to discover the reasons for their occurrence and the person who brought them about, and issue the recommendations to prevent repetition of these incidents.

2. **Qualification and Background of the Student:**

The students who will attend this course are required to have, at least, one of the following certificates:

- Master Mariner Certificate.
- Chief Engineer Certificate.
1. Obtain the higher certificate.
   (Master Certificate or First Engineer)

2. A certain number of years of experience.

Further, we have to consider those who have obtained the First Engineer or Master certificate before the previous eight years, i.e. in 1978 or before that. They had not been given the opportunity to investigate the effects of developments in the maritime field thoroughly. However, the quick development within the previous eight years (1978-1986) has brought about some changes in the field of the international maritime conventions in the following areas:

1. Safety at sea:
   a) Fire Fighting
   b) Ship Construction
   c) Safety Equipment

2. Pollution:
   The following items were added to the previous ones:
   a) Transport of the dangerous goods.
   b) Container handling.
   c) Transport of heavy goods.
   d) Transport of bulk cargo.

These items are various and numerous and the person in charge of the marine survey has to be informed about them through an acknowledged scientific authority and not by free research.
- Bachelor of Naval Architecture.
- B. Sc. Degree in Maritime Studies (AMTA)
- Bachelor's Degree in Marine Engineering Technology (AMTA)

3. **Course Duration:**

   The course duration is 194 hours, equal to ten weeks.

   (194 hours = 10 weeks)

4. **Facilities:**

   a) Tanker simulator
      - Tanker safety, tanker operations, stress calculation.
      - Load master computer.

   b) Radar simulator
      - Analysis of collision accidents.

   c) Automatic control laboratory.

   d) Oil pollution laboratory.

   e) Computer center.
      - Cargo lashing calculation.

5. **Teaching Aids:**

   - Films and slides.
6. Field Visits:

- Sumed Petroleum Pipelines Company *
- Suez Canal Authority
- Research Center, Traffic Control Center
- Alexandria Port

* Sumed Petroleum Pipelines:
The pipeline comprises two parallel lines each 42 inches diameter, with a total capacity of 80 million tons per year. These pipelines transfer petroleum from the loading terminal at "Ain Sokhna" in the Gulf of Suez to "Sidi Kerir" terminal in the Mediterranean, 27 kilometers west of Alexandria.

7. Assessment and Examinations:

- The participants are subject to continuous assessment during the whole period of theoretical, practical and applied studies, moreover, they sit for final written and oral examinations at the end of period of study.

* 60% of the total marks of each subject are assigned to continuous assessment, and, 40% for final examination.
Procedure and process of Marine casualty Investigation
Preparation of technical and legal Reports.

CASE STUDY

COLLISION
STRANDING
FONDERING
CAPSIZE
CARGO SHIFT
POLLUTION

FIRE & EXPLOSIONS
DAMAGE BY DANGERS
OUS GOODS

$8 \times 2 = 16 \text{ h}$

Total $= 194 \text{ h}$
Duration 18 Weeks

1 day 4 h
1 Week 5 Day
Total 20 h week
COURSE CONTENTS

The main casualty investigation course is divided into seven sub-courses which are shown in the chart below:

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Title</th>
<th>No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course 1</td>
<td>CI. 1</td>
<td>Safety on Board Ships</td>
<td>30</td>
</tr>
<tr>
<td>Course 2</td>
<td>CI. 2</td>
<td>Oil Pollution and Tanker Safety</td>
<td>30</td>
</tr>
<tr>
<td>Course 3</td>
<td>CI. 3</td>
<td>Cargo Securing</td>
<td>30</td>
</tr>
<tr>
<td>Course 4</td>
<td>CI. 4</td>
<td>Hazardous Cargoes</td>
<td>30</td>
</tr>
<tr>
<td>Course 5</td>
<td>CI. 5</td>
<td>Ship Stability &amp; Structure Stresses</td>
<td>20</td>
</tr>
<tr>
<td>Course 6</td>
<td>CI. 6</td>
<td>Supplement &quot;Marine Insurance&quot;</td>
<td>20</td>
</tr>
<tr>
<td>Course 7</td>
<td>CI. 7</td>
<td>Procedure and Process of Marine Casualty Investigation.</td>
<td>18</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Case-study</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL HOURS</strong></td>
<td><strong>194</strong></td>
</tr>
</tbody>
</table>

CI = Casualty Investigation

Daily teaching hours 4 hours  
Number of working days per week 5 days  
Total weekly teaching hours 20 hours  
Duration 10 weeks

* One teaching hour is equal to 50 minutes.
This course is a flexible one. It can be given as a deal-package to those who are interested to work in the maritime field as marine experts, or can be divided into the following six short courses concerning different types of marine casualty investigation (SCCI), according to the needs of the participants:

1. SCCI - 1 Safety on Board Ships and Marine Casualty Investigation.
2. SCCI - 2 Oil Pollution, Tanker Safety and Marine Casualty Investigation.
3. SCCI - 3 Cargo Securing and Marine Casualty Investigation.
4. SCCI - 4 Hazardous Cargoes and Marine Casualty Investigation.
5. SCCI - 5 Failure of Ships Structure and Marine Casualty Investigation.
The Duration of specialized short courses concerning marine casualty investigation

<table>
<thead>
<tr>
<th>short courses</th>
<th>sub-Courses</th>
<th>case study</th>
<th>total hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCCI- 1</td>
<td>CI 1 &amp; CI 7 (30h) + (18h)</td>
<td>6</td>
<td>54 h</td>
</tr>
<tr>
<td>SCCI- 2</td>
<td>CI 2 + CI 7 (30h) + (18h)</td>
<td>6</td>
<td>54 h</td>
</tr>
<tr>
<td>SCCI- 3</td>
<td>CI 3 + CI 7 (30h) + (18h)</td>
<td>6</td>
<td>54 h</td>
</tr>
<tr>
<td>SCCI- 4</td>
<td>CI 4 + CI 7 (30h) + (18h)</td>
<td>6</td>
<td>54 h</td>
</tr>
<tr>
<td>SCCI- 5</td>
<td>CI 5 + CI 7 (20h) + (18h)</td>
<td>6</td>
<td>44 h</td>
</tr>
<tr>
<td>SCCI- 6</td>
<td>CI 7 (18h)</td>
<td>10</td>
<td>28 h</td>
</tr>
</tbody>
</table>

SCCI : Short Course For Casualty Investigation
CI : sub-course for Casualty Investigation
" see the outline of the sub-courses "
THE OUTLINE OF THE SUB-COURSES
Part I. Safety of Navigation:

1. Knowledge of the Rules of the Roads:

1.1 As mentioned before, the course demands all the participants to have a Master's Certificate and sea experience. This requirement makes them fully aware of the rules of the road. In this course, however, we discuss these rules from their legal point of view.

To develop the analysis of the legal aspect of the rules of the road (COLREG 72) the following should be considered:

- Rule No. 2 - from part (A) - "Responsibility"
- Rule No. 6 - from part (B) - "Safe Speed"
- Rule No. 7 - from part (B) - "Risk of Collision"
- Rule No. 8 - from part (B) - "Action to Avoid Collision"
- Rule No. 19 - from part (B) Section III "Conduct of Vessels in Restricted Visibility"
1.2 To introduce Navigation Equipment on board ships.

- Performance standards for navigation equipment.

1.3 Uses of Simulator for Marine Casualty Investigation.

2. Search and Rescue:

2.1 Search and Rescue Organization:
- Planning of a search and rescue service.
- Selection of components for search and rescue.
- Search and rescue supplies and survival equipment.
- Search and rescue communications practices and procedures.
- Ship routing system.

2.2 Search and Rescue Procedure:
- The maritime search and rescue incident.
- Determination of search areas.
- Communication.
- Search techniques.
- Conduct of the search.
- Rescue of survivors.
- Emergency assistance other than search and rescue.
- Search and rescue training.
2.3 Ship Reporting System:


3. To Understand the Outline of the Following:


3.2 Operating agreement on the International Maritime Satellite Organization (INMARSAT) 1976.

4. Determine the relevant requirements and safety regulations, of life saving appliances on board ships as specified in the SOLAS Convention of 1974 and its Amendments.

Part II. Firefighting:

Objectives:

The main objectives of this part are:

1. To fully understand the theory of combustion and sources of ignition on ships for all types of fires and ships.
2. To examine the firefighting equipment on board ships according to IMO Conventions and Regulations.

3. To develop methods of fire prevention and firefighting on board the different types of ships, i.e., Cargo, Tanker, Gas Carriers, etc.

4. To introduce a way or solution in discovering the defect in case of marine casualty concerning fire and explosion.

5. To consider the fire fighting requirements according to IMO Conventions and Regulations.

5.1 Merchant shipping fire fighting appliances rules dealing with the provision of fire protection on ships of various types:
   - Passenger ships
   - Cargo ships
   - Special ships such as:
     a) Tankers (Oil Tanker, Chemical Tanker, Gas Carriers).
     b) Container Vessels
     c) Ships carrying explosives
     d) Ships carrying dangerous goods as specified in IMDG Code.
5.2 To determine requirements and regulations related to fire fighting on board ships, as it appears in Chapter II-2 of the International Convention for the Safety of Life at Sea 1974, and its Amendments.

- Fire safety measures for passenger ships carrying more than 36 passengers.
- Fire safety measures for passenger ships carrying less than 36 passengers.
- Fire safety measures for cargo ships
- Fire safety measures for tankers.
- Fire protection and fire extinguishing on board ships carrying liquefied gases in bulk as defined by International code for the construction and equipment of ships carrying liquefied gases in bulk (GC Code - A. 328 "IX").
- Fire protection and fire extinguishing on board ships carrying dangerous chemicals in bulk as defined by International code for the construction and equipment of the ships carrying dangerous chemicals in bulk (IBC & BCH Code - A. 212 "VII").

Facilities and Teaching Aids:

- Firefighting laboratory
- Video cassette films
- Radar simulator

Course Duration:

The total duration for Part I and Part II of this course is 30 hours.
TANKER SAFETY AND OIL POLLUTION:

Objectives:—

To fully understand the safety guide marks and recommendations for practices to be adopted by tanker and terminal personnel. Also to ensure safety in operations relating to carriage by sea and handling on tankers and at the terminals of crude oil and petroleum products, according to the IMO Conventions, Regulations, and Resolutions.

Part I. Operations:

1. Hazards of petroleum.
2. General precautions on tankers.
3. Procedures to be taken by tankers on arrival in port.
4. General precautions while a tanker is at a petroleum berth.
5. Liaison between tanker and terminal before cargo handling.
6. Precautions before and during cargo handling and other cargo tanker operations.
7. Handling of cargo and ballast.
8. Tank cleaning and gas freeing.
10. Entry into and work in closed spaces.
11. Combination carriers
12. Packaged cargoes.
   Terminal emergency plan, tanker emergency plan,
   Fire on tanker at sea or at anchor, jettison of
   cargo.

Part II. Technical Information:

1. Basic properties of petroleum.
2. Toxicity of petroleum and associated substances.
3. Hydrocarbon gas evolution and dispersion.
4. Gas indicators.
5. Electrical equipment and installation.
6. Static electricity.
7. Pressure surge.
8. Fire fighting - "Theory and Equipment".
9. Ship/shore safety check list, guide-lines and
   specimen letter.
10. Applying the recommendation of International
    Chamber of Shipping for the following:
    - Tanker safety guide.
    - Tanker safety guide (Chemicals) to the
      handling and carriage of bulk liquids in ships.
    - Tanker safety guide (Liquefied gas).

Part III. Oil Pollution:

1. International regulations for the prevention
   of pollution by oil.
2. Rules for the prevention of pollution from ships:

2.1 Supervision regulations

2.2 Construction and equipment of ships for the prevention of pollution by oil.

2.3 Construction and equipment of ships for the prevention of pollution in the carriage of noxious liquid substance in bulk.

2.4 Equipment and installation of ships for the prevention of pollution by sewage.

2.5 Equipment and installation of ships for prevention of pollution by garbage.

2.6 Construction and equipment of ships carrying dangerous chemicals in bulk.

2.7 Damage control.

3. Sources of Oil Pollution:

3.1 Effects of oil pollution on the marine environment.

3.2 International, regional, and national legislation relating to avoidance of pollution by ships.

3.3 FUND Conventions and Civil Liability.

3.4 Pollution damage liability and compensation.

4. Outlines of IMO publications concerning marine oil pollution such as:-
4.1 International Convention & Protocols:

- Tanker safety and pollution prevention protocol (MARPOL PROT 1978)
- Article 145 and section 5, from the "LAW OF THE SEA" convention concerning international legislation to prevent, reduce and control pollution of the marine environment.

Facilities:

- Tanker simulator
- Video cassette films
- Field visit to "Sumed Petroleum Pipeline"
- Oil pollution laboratory.

**Course Duration:**

The duration of this course is 30 hours.
CARGO SECURING:

Objective:

The main objective of this course is to understand the relation between the ships dynamics and safe transport of cargo, as well as calculation of the cargo lashing forces.

Part I. Ship Dynamics and Safe Transport of Cargo:

1. To consider the safe stowage and securing of cargo.
2. To consider and comprehend the following:
   2.1 Definition of acting forces and their direction.
   2.2 Position of cargo in ship with respect to the turning centre of ship motion.
   2.3 Compilation of ship motion accelerations depending on place of stowage.
   2.4 Calculation method for ship motion dependent accelerations.
   2.5 Choice of input parameters, development and updating.
   2.6 Avoiding roll resonance.
   2.7 Lashing forces.
   2.8 Lashing strength and safety factors.
   2.9 Homogeneity of cargo lashing strength.
   2.10 Observation chart on extreme ship motion and extreme lashing forces.
Part II. To Develop the Following Items:-

1. Marine environment and ocean wave analysis.
2. Ship response to ocean waves.
3. Stability of ships in the following seas:

Part III. To Determine and Understand the Following Items:-

1. Categorization of ships and cargoes.
2. The general aspects and principles of safe storage and securing of cargo.
3. The methods of standardized storage and securing systems.
4. Semi-standardized storage and securing arrangements.
5. Non-standardized storage and securing of cargo.
6. Ship handling in heavy weather.
7. Practical cargo securing calculation.
8. Cargo securing calculation by computer.

Sources of Information and Syllabus:

The above syllabus has been developed, based on the following:-

1. IMO Resolution, A.489 (XII), adopted on 10 November 1981.
3) Safe stowage and securing of cargo units and other entities in ships other than cellular container ships.

b) "Ship dynamics and safe transport of cargo", lectures delivered by:-
1. Prof. Dr. Eng. S. Kastner
2. Prof. Cap. H. Kaps

held at the World Maritime University, 1985.

Facilities:-

- Computer laboratory.

Course Duration:

The duration of this course is 30 hours.
DANGEROUS CARGOES:

General:

This course gives us the particulars about the amount and types of the dangerous goods which are commonly carried by sea on conventional break bulk ships and on specialized vessels like container ships, RO/RO, barge and bulk carriers. The hazards of cargo could be one of the causes for certain occurrences and lead to damages to the ship. Even sometimes it could be the main reason for a casualty, such as fire. Accidents may be exemplified in order to impart an idea about the hazards of the dangerous goods. The introductory lesson shall convince the participants of the need for an effective control of the carriage of the dangerous goods by sea. Those who will be in charge of dealing with casualties caused by hazardous cargo must be very well aware of the basis and fundamentals of carrying dangerous goods.

Part I. Physical Hazards and Properties:-

1. The contents should be confined to absolutely necessary facts, have a refreshing character and be related to the IMDG class, considering the following points:

1.1 Explosion hazards (mass explosion,
projection hazards), travelling speed and distance of the shock waves.
1.2 To relate vapour pressure/temperature, flashpoint, boiling point, explosive range and limits specific gravity and vapour density.
1.3 Radioactivity and forms of radiation.

Part II. Chemical Hazards and Properties:-
1. To have the basic chemical knowledge, including combustion.
2. To relate reactivity with oxygen.
3. To introduce self-reactivity and decomposition.
4. To relate reactivity with water.
5. To introduce reactivity among various substances.
6. To introduce water solubility.

Part III. Health Hazards:-
In a brief out-line the participants should be made familiar with the specific health hazards emanating particularly from toxic gases and spillages and the applied criteria.
1. Oral, dermal and inhalation toxicity limits.
2. Radiation contamination.
3. Necrosis of skin tissue.

Part IV. International Conventions, Codes and Recommendations, and Pertinent National Laws and Regulations:

1. IMO's role in establishing internationally agreed instruments and their implementation in individual countries.
2. International Convention for the Safety of Life at Sea, 1974, particularly Chapter VII.
5. Code for the construction and equipment of ships carrying dangerous chemicals in bulk and code for ships carrying liquefied gases in bulk.
8. Recommendations on the safe transport, handling and storage of dangerous substances in port areas.
Part V. Analysis of IMDG Code:

1. Classes and their properties.
2. Identification, marking and labelling.
3. Packaging and packing (including testing).
4. Stowage and segregation on board ships.
5. Information flow and documentation.
6. Dangerous goods in containers and portable tanks.
7. Dangerous goods on RO/RO vessels.
8. Dangerous goods in limited quantities.

Part VI. Shipment of Dangerous Goods:

Based on the flow chart and simple case studies, a shipment of dangerous goods from its' first booking to the stowage or acceptance on board should go through the following stages:

1. Acceptance procedures of an offer for shipment of dangerous goods.
2. Special procedures regarding the transport of dangerous goods in containers. Responsibilities in packing documentation, marking, labelling, etc.
3. Cooperation and communication between ship and port, operational procedures in port.
4. Preparation on board ships.
   (Tentative stowage plan for on/under
deck cargo, segregation, etc.)

5. Documents which should be received
   by the ship's Master and responsibility
   in comparing the physical shipment with
   the documents and other responsibilities.

Part VII. Shipboard Application:

1. Handling, stowage, and segregation:
   1.1 Class 1 - Explosives:
       - Hazard divisions, compatibility
         groups and stowage categories.
       - Suitability of cargo spaces.
       - Magazines.
       - Security.
       - Segregation within Class 1.

   1.2 Class 2 - Gases (compressed, liquefied or dissolved under pressure)
     flammable, non-flammable and toxic
     types of pressure vessels and
     portable tanks relief and closing
     devices.

   1.3 Class 3 - Flammable liquids.
       - Classes
       - Receptacles, tank containers and
         portable tanks.
- Road tank vehicles.
- Empty receptacles.
- Ventilation and drainage of compartments.

1.4 Class 4.1 - Flammable solids.
Class 4.2 - Flammable solids or substances liable to spontaneous combustion.
Class 4.3 - Flammable solids or substances which in contact with water emit flammable gases.

Measures used to prevent heating, ignition, or the emission of toxic or flammable gases.

1.5 Class 5 - Oxidizing substances (agents) and organic peroxides.
- Reaction with acids.
- Sensitivity to heat.
- Explosive decomposition.
- Prevention of spillage.
- Separation from combustible.
- Separation from combustible materials.

1.6 Class 6 - Poisonous (toxic) and infectious substances;
- Prevention of leakage.
1.7 Class 7 - Radioactive substances.
- Types of packages.
- Full load shipments.
- Segregation.
- Decontamination.
- Transport index.
- Stowage limitation.

1.8 Class 8 - Corrosives.
- Dangers from leakage and spillage.
- Dangers from wetted substances.

1.9 Class 9 - Miscellaneous dangerous substances.
- Examples and associated hazards.

1.10 Materials hazardous only in bulk (MHB)
- Examples and associated hazards.

2. Safety precautions and emergency procedures:
2.1 Electrical safety in cargo spaces.
2.2 Precautions to be taken for entry into enclosed spaces that may contain oxygen depleted, poisonous or flammable atmospheres.
2.3 The possible effects of spillage or fire shipments of substances of each class.

2.4 Consideration of events on deck or under deck.

2.5 IMO Emergency Procedures for ships carrying dangerous goods.
   IMO emergency plans and procedures to be followed in case of incidents involving dangerous substances.

3. Medical first aid:

3.1 The IMO medical first aid guide for use in accidents involving dangerous goods (MFAG).
   Use and application in association with other guides.
   Medical advice by radio.

Part VIII. Safety Management on Boardship in Regard to the Dangerous Goods:

1. Safety philosophy (information, preparation, emergency action).

2. General safety training of crew.

3. Emergency stowage plan.

4. Special exercise of emergency squad.

5. Need for pollution prevention.
Part IX. Emergency Equipment:

Since all participants should have already gone through a basic fire-fighting course, they are expected to be familiar with the under-mentioned items which are restricted to the fire problems relating to dangerous goods.

1. Fire-fighting media available on board ship and their effects on certain dangerous cargoes and chemicals.
2. Portable and fixed detection equipment and installations.
3. Portable and fixed fire-fighting equipment and installation.
4. Personal protection.
5. Pertinent reference literature (emergency procedures for ships carrying dangerous goods and medical first aid guide).

Part X. Emergency Procedures:

1. Fighting of chemical fires.
2. Fighting of chemical spillages.
3. First-aid procedures.

Sources of Information and Syllabus:

The above syllabus has been developed, based on the following:
1. IMO Resolution A.537 (XIII):
   "Training officers and ratings responsible for cargo
   handling on ships carrying dangerous and hazardous
   substances in solid form in bulk or package form."

2. "Dangerous Goods - Training Aspects"
   Lecture delivered by Capt. K. Brunings at the World
   Maritime University.

   **Teaching Aids:**
   - Slides.
   - Video cassette films.

   **Course Duration:**

   The duration of this course is 30 hours.
This course deals with the forces which induce bending, shearing and torsional stresses into the structure of the vessel, including methods of calculation bending, shear and torsional forces in practice.

Objectives:-
The objectives of this course are as follows:-

a) To define, shear, bending and torsional forces.
b) To consider shipboard computers and the approved stability booklets.
c) To consider the ship(s) in damaged condition.
d) To examine the stresses induced into the vessel structure by bending moment and shear forces.
e) To calculate bending moment and shear forces.
f) To understand the outline of stability requirements for vessels loading bulk grain.
g) To discuss the marine casualty case-study from the stability point of view.

Part I. Longitudinal hull strength:-

1. The ship as structure:-
   1.1 Strength of structure.
   1.2 Strength of materials.
   1.3 Properties of metals.
   1.4 Stresses on loaded beam.
   1.5 Longitudinal strength on ships.
1.6 Summary of longitudinal hull strength aboard ship.
1.7 Bending moment and shear force in a dry bulk carrier.

Part II. Shipboard Computers and the Approved Stability booklet:
1. Evolution of the loading computer.
2. Need for new loading computers.
3. The approved trim and stability booklet.

Part III. The Ship in Damaged Condition:
1. The damaged condition.
2. Damaged condition due to collision.
3. Effect of flooding on transverse stability.
4. Remedial measures to improve transverse stability.
5. Dangerous effect of flooded wing compartments.
6. Added weight method using the statical stability curve.
7. Effect of grounding on stability.
8. Longitudinal hull strength and damaged condition.

Part IV. Practical Stability and Trim Consideration:
1. Factors affecting the rolling of ships.
2. Antirolling devices and their effects.
3. Effect of synchronization.
4. Safety with small "GM".
Part V. Stability Requirements for Vessels Loading Bulk Grain:

1. Background information about "Concerning" bulk grain.
2. IMO Grain rules.
4. Calculation of "Volumetric" heeling moments.
5. Allowance for a vertical shift of grain.
6. Stability regulations for loading bulk grain.
8. Preloading planning calculation.

Part VI. Marine Disasters:

1. Case-study about marine casualty from stability point of view:
   1.1 Fire and capsizing.
   1.2 Grounding.
   1.3 Collision.
   1.4 Insufficient reserve buoyance

Course Duration:

The duration of this course is 30 hours.
This course deals with supplementary subjects related to the marine casualty investigation.

Part I. Marine Insurance Claims and Loss Prevention:

The following items should be understood:

1. The principles of compensation.
2. Partial loss of cargo and freight.
3. Examples on settlement of damage.
4. Documents used for compensation.
5. Application of conditions of cargo insurance.
6. The role of the adjuster; the case of loss adjustment for particular average.

Part II. Other Related Subjects.

Course Duration:

The duration of this course is 20 hours.
PROCEDURE AND PROCESS OF MARINE CASUALTY INVESTIGATION AND
PREPARATION OF TECHNICAL AND LEGAL REPORT:

Part I. General Introduction:

1. Investigations, general introduction
2. Investigation purpose, sources of information.
3. Coordination with other activities.
4. Qualification of the investigator.
5. Type of investigation, jurisdiction, and legal terms.
6. Investigation fundamentals.
7. Interview techniques.

Part II. Documentation of Information:

1. General sources of documentation.
2. Written statements.
4. Evidence.
5. Transcribed records.

Part III. Procedures Against Licenses:

1. Procedures against seamen's papers, documents, etc.
2. Licenses and Certificates.
3. Authority, policy, status, and jurisdiction.
4. Investigation pertaining to seamen's papers.
5. Determination of actions to be taken.
6. Procedures prior to a hearing.
7. Charges and specifications (misconduct, negligence, etc.)
8. Hearings.
9. Official marine records (shipping articles, logbooks, etc.)

Part IV. National Laws and International Obligations:

1. National laws and regulations concerning marine casualties.

2. International obligation for coastal states referring to marine casualty investigation:
   2.1 SOLAS Convention 1974 - Chapter 1 Part (c) - casualties regulation 21.
   2.4 Resolution A.173 (Es. IV) 28 November 1968, participation in official inquiries into marine casualties.
   2.5 Resolution A.322 (IX) 12 November 1975, the conduct of investigation into casualties.
   2.6 Resolution A.440 (XI) 15 November 1979.
exchange of information for investigations of the marine casualties.

2.7 ILO convention No. 147, 1976, concerning minimum standards in merchant ships.

2.8 STCW Convention, 1978 for the minimum standards of masters, officers, engineers, and the crew on board merchant ships.


Part V. Marine Casualty Investigation in Other Countries

"Legislation and practice"

1. United Kingdom.
2. United States of America.
4. France.

Part VI. Marine Casualty Investigation

"General Provisions"

1. Legal authorities.
2. Purpose of marine casualty investigation.
3. Civil and criminal responsibilities.
4. Legal assistance to investigator.
5. Investigation reference materials
   (Laws, rules and regulations - common terms)
7. Parties' interest.

Part VII. Notification of Significant Marine Casualties:

1. Initial notification.
2. Prompt investigation (Intensive).
3. Casualty law and notification reports in the territorial waters and high seas.
4. Notification of national authorities.
5. Form and content of notification.
6. Notification to other interested parties.

Part VIII. The Investigator:

1. Qualities of the investigator.
2. Professional background.
3. Training of the investigator.
4. Investigation equipment.
5. The main duties of the investigator.
6. Instructions to investigator.
7. Marine boards of investigation.

Part IX. Marine Casualty Investigation Procedures:

1. Types of investigation:
   1.1 The human factors.
   1.2 Informal investigations (one man investigation).
1.3 Preliminary inquiries.
1.4 Preliminary inquiries by surveyors.
1.5 Formal investigation.
1.6 Death inquiries.
1.7 Miscellaneous.

Part X. Casualty Investigation Reporting Procedures:

1. Report of vessel casualty or accident forms.
2. Completion and use of forms.
3. Contents of reports.
4. Narrative reports.
   (General, Subject, Topic, Vessel and Cargo Data and other information.)
5. Conclusions in the narrative reports.
   (Proximate Cause, Contributing Cause, description of cause or causes.)
7. Conclusions from marine boards on evidence of culpability.
8. Other conclusions.

Part XI. Recommendations:

1. Basis for recommendations.
2. Revision of investigation report.
Part XII. Investigation Records:

1. Modifications of precept.
2. Make-up of the investigation records.
3. Records filed at the headquarters.
4. Transcript of testimony.
5. Investigation reports.
6. Data bank.

Part XIII. The Main Points, Frameworks and Guidelines and Check Lists for the Common Types of Deck Casualties:

1. Procedure for investigation.
2. Ship's data, weather data, voyage data, fire-fighting particulars.
3. Collision:
   3.1 Fault, diagrams, navigation equipments, speed data, etc.
   3.2 Events after collision.
4. Heavy weather casualty. The damages caused by heavy weather.
5. Groundings:
   5.1 Grounding common causes
   5.2 Grounding in restricted waters
   5.3 Impotent points to consider in grounding cases.
   5.4 Events leading to the grounding.
   5.5 Events after grounding.
6. Founderings:-

6.1 Factors involved in founderings.

6.2 Important points to consider in founderings.

Part XIV. Cargo Fires and Explosions:-

1. Cargo fires and explosions at sea.
   (checklist)

2. Cargo fires and explosions at port.
   (checklist)

3. Electrical casualties.

4. Vessel, cargo, safety equipment, and local port regulations.

5. Failure of gear and equipment:
   General information, davits, cargo gear, hatches, personnel involved, mooring lines, anchoring, etc.

Part XV. Engine-Room Casualties:

1. The common engine-room casualties
   (with checklist)

1.1 Boiler casualties.

1.2 Electrical casualties.

1.3 Machinery casualties.

1.4 Main engine (reciprocating) casualties.

1.5 Main turbine casualties.
1.6 Miscellaneous equipment casualties:
- Firelines, bilge pumps, failure of smothering system, etc.
- Main engine (Motor) casualties.

Part XVI. Petroleum Tanker Explosion and Fire:

1. Petroleum tanker explosion and fire at sea (checklist).
2. Petroleum tanker explosion and fire at port (checklist).
   (During loading or discharge.)
3. Chemical tanker explosion and fire (checklist).
4. Liquefied gas tanker explosion and fire (checklist).

This point should be considered that all the checklists should include description of vessel, cargo, damage cargo tanks, external damages, pollution, and so on.

Part XVII. Pollution Investigation:

1. The pollution investigator's authorities:
   1.1 Responsibility to investigate - Practical limitations.
   1.2 Implicit requirement to investigate.
1.3 Agreements regarding re-investigation.
1.4 Pollution penalty mandate, according to the law.
1.5 Application of the pollution laws and regulations.

2. Pollution incident investigation:
2.1 Purpose of pollution investigations.
2.2 Types of investigations:
   - Investigations for civil penalty action.
   - Investigations in non-notified action of pollution incidents.

3. Collection of evidence:
3.1 Photographic evidence.
3.2 Statements.
3.3 Witnesses.
3.4 Format of statements.
3.5 Sampling procedure:
   - Purpose of sampling.
   - Storage of samples.
   - Sample analysis.
3.6 Other real evidences.

Part XVIII. Pollution Reports.

Course Duration:

The duration of this course is 18 hours.
Second. THE MARITIME RESEARCH AND CONSULTANCY CENTER

(M R C C)

Introduction:

The world's greatest water passage is Suez Canal which is in Egypt. This factor makes the transport sector in Egypt one of the most important sectors which serves the Egyptian economy. The volume of investments therein is amounted to many milliards for its various activities such as seaport, ships and ship yards in Alexandria, Port Said, navigational agencies and the other maritime activities.

The idea which called for forming a maritime transport research and consultancy center in Egypt was generated in the Arab Maritime Transport Academy in order to present the technical and scientific services for each sector in accordance with its requirements. This idea appeared in the Arab Maritime Transport Academy which is a sanctuary of the maritime sciences. At this Academy the different maritime cadres will be educated and trained in the following manner:-

1. Educating and training the maritime officers and marine engineers.

2. Convening courses in diploma of maritime transport economics.

3. Convening courses in diploma of the maritime law.
4. Convening courses in diploma of the maritime insurance.

5. Special courses in the field of the activities and administration of the seaports.

Besides the ones mentioned above, there are many other technical and specialist studies in the maritime field which take place at this Academy.

The Arab Maritime Transport Academy (A.M.T.A.) has the largest number of the specialists, scientifically and practically, in all kinds of the maritime sciences. Among them there are 28 Ph.D. holders in various specifications and 39 M.Sc. holders in all kinds of the scientific branches. In addition, there are quite a number of other qualified people in this Academy such as Captains, Senior Engineers and Technicians in sciences of the maritime administration.

The Arab Maritime Transport Academy was the pioneer which called for establishing the Maritime Research and Consultancy Center (M.R.C.C.).

**Birth of the M.R.C.C.**

The Maritime Research and Consultancy Center has been established by a decision of Minister of Transport, Communication and Maritime Transport in 1984 provided that its domicile would be in the Arab Maritime Transport Academy and its board of directors is presided by Minister of Maritime Transport.
The method by which the Center is Provided with Information:

The information is an inexhaustible source and servicing of information is considered as an investment to it; the more effective the use of the available information the more influences the issuance of the correct decisions.

The most important principal sources which must form the infrastructure of the center are perfect sources of information, the extent of availability and verification of this information being most important factor. Therefore, the Center participates in a group of the most important and most comprehensive bases of data and world information banks, in terms of the artificial satellite, and by coordination with the computer center in the Academy (which includes two information centers, one in the United States and the other one in Europe). The Center also participates in the Egyptian Information Bank which concerns the Central Agency for Filling and Statistics.

Accordingly, the main objective of the above mentioned is to meet the requirements of the maritime transport sector for information. Yet the available potentialities and available communications make it possible for the Center to extend the field of its activities to include any other sector which demands information such as the universities, research centers of companies, companies which work outside the framework of the maritime field, and some governmental agencies.
The Method by which the Information is Presented:

The Center provides the information services, free of charge, for the companies and organizations participating in the research centers. However, it is considered that in the case of demanding special information from the Center's data bank in Alexandria, the actual cost will be paid. This information is demanded through the international information banks. Every month the bank also publishes a circular bulletin about some of the important information generally concerning those who work in the maritime field.

How to Subscribe to the Maritime Research and Consultancy Center (M.R.C.C.)

At the beginning of construction of the Center in 1984, seventeen companies and authorities from the maritime transport authorities subscribed to the Center. They represent the Center's board of directors. The yearly subscription amounts to thirty thousand Egyptian pound. The subscriber has the right, at any time, to request the information which he needs from the feasibility studies. He asks the Center to prepare them and in case the cost of the study is more than the value of the subscription, then the difference will be paid by the subscriber himself.

M.R.C.C.'s Activities:

Since construction of the Center, it has performed many scientific studies which it has been directed to prepare through the maritime transport sector as well as the fluviatile transport sector which
is interested in the fluvial navigation through the Nile as from Alexandria till the borders of Aswan in the south. It has also performed the feasibility studies for the economic projects. The most important projects which have been performed by the Center are as follows:

1. A study about the best size of the navigational companies.

2. A study about the best size of a number of the ships on a navigational line in accordance with the requirements of the Egyptian foreign trade.

3. A complete study about construction of a containers terminal in Port Said Harbour.

4. A study about the use of the integrated computer system for the container terminal in Alexandria Port.

5. A study about the use of computer in the new port of El-Diykhilah (West Alexandria Port) and perform once of all the special programs by computer (Soft-ware) according to the system which is in force in Egypt.

6. Studying of preparation of plan to follow up maintenance of the ships by means of computer.

7. Building a complete information system for the General Authorities for silos and warehouses of the Ministry of Supply. There are also other studies which are performed in the field of the maritime constructions.
At the present time the Center is performing important studies in the following subjects:

1. Determining the navigational course for Nile River from Alexandria to Aswan.

2. Determining and constructing navigational passage for the Nilotic ships in Nasir Lake from Port of Aswan (The High Dam) to the end of Egyptian/Sudanese borders.

3. Generalization and promotion of the navigational relations (lighthouses, buoys, etc.) in Nasir Lake and Nile regions in Egypt/Sudan borders.

A New Role for the Research Center in the Arab Maritime Transport Academy (A.M.T.A.):

As was mentioned before, there are quite a large number of maritime experts such as Masters, Engineers, and Administrators in this Research Center. On the other hand the Center gets a considerable amount of scientific information through the communications network with foreign countries. It also uses all the laboratories of the Arab Academy either for the maritime (surface section) or for the engineering section. All of these factors make it possible for the Research Center to be attributed to analyse the maritime accidents and casualties which occur on the Egyptian shores.
CHAPTER VIII

SUMMARY AND CONCLUSION WITH RECOMMENDATIONS
SUMMARY

The purpose of this thesis is to propose a new role for Maritime Academy concerning investigation and analysis of marine accidents, bearing in mind the role of marine investigators and marine experts in this connection. This has been done by analysing the marine casualties occurring in the last five years, the characteristics and qualifications of marine investigators and the role of maritime academies in educating and training the marine investigators. It has been considered necessary to review the marine casualty investigation process and the role of preliminary inquiry, narrative report, and recommendations.

1. In the beginning, the different types of marine casualties have been defined and classified, according to the international measurements, providing the statistic data of each type during the past five years (1981-1985).

2. The main purpose of marine casualty investigation is to obtain information for the prevention of similar casualties, as far as practicable. It is necessary that the causes of the casualty be determined as precisely as possible in order that detailed factual information will be available for review and statistical studies. It is not sufficient to know only how a casualty occurred it must also be clear why it happened. Based on this information appropriate corrective measures, regulations and standards of safety may be developed and instituted. In this connection the coastal state must establish the necessary infrastructure to conduct inquiries and to meet the national and international obligations concerning the marine casualty investigation. The success of the investigation system depends on the efficiency of the marine personnel dealing with marine casualties.
3. The check list is one of the most important papers that the investigator should use to collect the necessary data, in order to make a full evaluation of the accident. Therefore, two patterns of check list were presented to be used in case of collision or grounding accidents.

4. By applying what has been mentioned before on the marine accidents which occurred in the Egyptian territorial waters and ports, a full explanation has been presented. This explanation concerns the investigation and analysis system of the marine casualties in Egypt according to the national legislation, and contains the role of marine experts.

By the presentation of three marine casualties which occurred in Egyptian territorial waters and ports, the way has been promoted to carry out an inquiry and further the decision being submitted by the inquiry board.

5. The marine accidents in the navigational canals have special characteristics. In this connection a brief study has been submitted about the marine accidents in canals, specially the accidents occurring in the Suez Canal during the year 1983. Also a comparison has been made between the number of accidents which occurred in Suez Canal and others such as Panama and Kiel Canals.

It is important to analyze such accidents in order to increase the safety elements in the canals.

6. After a complete presentation of the previous items, it seems vital to have efficient investigators and marine experts who know the scientific and practical approaches to investigate and analyse the marine accidents. To have personnel with such qualifications, a specialized
course must be held by the Maritime Academy.

In this connection, we have offered a detailed proposal to this course, containing syllabus, course duration, facilities, teaching aids, and field visits. This course is also a flexible one, which can be given as a package-deal to those who are interested in working in the maritime field as marine experts in 194 study hours in 10 weeks, or can be divided into six short courses concerning different types of marine casualty investigation, according to the needs of the participants. The duration of these short courses differs from 28 to 54 study hours.
RECOMMENDATIONS

Firstly: To Arab Maritime Transport Academy (Alexandria)

1. Performing a study in the Arab Maritime Transport Academy which concerns marine casualty investigations and their analysis.

2. Publishing causes of the accidents which have happened and method of getting benefits from the mistakes which occurred, the recommendations to avoid repetition of their occurrence and making efforts so as to get these publications to those who work on board ships, crew members, officers and masters.

3. The Arab Maritime Transport Academy with its pioneer role in the scientific and maritime field must allocate a permanent chapter in the magazine of the Academy which is issued each six months so as to analyze local or world maritime accidents to determine their causes, crew mistakes, and how to avoid them.

4. The Academy allocates a paper about the maritime accidents in its monthly publication which includes a brief summary about the most important maritime accidents which occurred within the bygone month.

5. Entering the practical and scientific application to the maritime accidents which occurred during previous periods in the syllabus of nautical courses, such as getting benefits from maritime collision accidents in the Radar Simulator course, getting advantages from stranding accidents in teaching the Seamanship subject, and tanker casualties in the Tanker Operation Course.
6. Utilizing the Research Center in the Academy to perform the investigations and analysis of maritime accidents.

7. Presenting a proposal to the authorities of Marine Experts Matters in which it should be indicated that in order to have permission to work as a Maritime Surveyor, one must have a certificate in investigation of maritime accidents and their analysis.

Secondly: To Maritime Authorities

1. In case of performing specialized courses in the Arab Maritime Transport Academy (AMTA) for marine casualties investigation and analysis, the following persons shall get benefits from this program (courses):

All degrees of the maritime surveyors who work in the government, navigation companies, those who are responsible for the ports administrations in Alexandria, Port Said, Suez and Damietta, as well as the independent surveyors and those who are responsible for the maritime accidents in the Suez Canal Authority.

2. Seeking help from the Research Center in the Arab Maritime Transport Academy in performing analysis of the maritime accidents. Mandate the masters and engineers who work in the Nautical and Engineering Department to participate in an investigation board, and to declare their opinion.

3. Setting up a complete data system centered in the Port and Light Houses Administration, performed by the Research Center. This system would collect all the information about marine accidents and their analysis.
4. The Research Center in the Academy is presided over by the Minister of Transport, Communications and Maritime Transport which gives the Center the executive power for application of the above items. On the other hand, the Director General of the Port and Light Houses Administration is a member of the Board of Directors of the Arab Maritime Transport Academy.
ANNEX I

FORMAT OF MARINE CASUALTY REPORTS
(IMO)
Brief account of the sequence of events of the casualty:

Brief account of any assistance given to the ship and/or rescue services provided:

Brief account of the extent of the damage to the ship:

<table>
<thead>
<tr>
<th>Number of lives lost</th>
<th>Did pollution occur? (From subject ship only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crew:</td>
<td>Yes/No *</td>
</tr>
<tr>
<td>Passengers:</td>
<td>Pollutant</td>
</tr>
<tr>
<td>Other:</td>
<td>Amount, if known</td>
</tr>
</tbody>
</table>
ANNEX (4)

FORMAT OF MARINE CASUALTY REPORTS

NOTES

1. Administrations are urged to complete this form in respect of casualties to ships of not less than 1600 gross tonnage which are a total loss, including a constructive loss, and to ships of not less than 500 gross tonnage involving loss of life.

2. The information to complete the form should be based on:
   - the report of a court or board of formal investigation; or
   - the report of a preliminary investigation carried out by the Administration; or
   - the report of an informal fact finding investigation carried out by the Administration.

3. When possible, a copy of the report mentioned in paragraph 2 or an extract thereof should accompany this form.

4. If sufficient space is not available then reference may be made to the report of an additional sheet of paper should be used.

<table>
<thead>
<tr>
<th>Name of ship</th>
<th>Distinctive No. or letters</th>
<th>Type of ship</th>
<th>Year of build</th>
<th>Flag</th>
<th>Gross Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date of Casualty</th>
<th>Time of Casualty (local time)</th>
<th>Type of Casualty (i.e. fire, foundered, etc.)</th>
<th>Name(s) and Flag(s) of other ships involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day Month Year</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of place or sea where casualty occurred</th>
<th>Latitude and longitude of casualty</th>
<th>State of sea, weather and visibility at time of casualty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Port last sailed from and date of sailing</th>
<th>Port of destination</th>
<th>Cargo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Status (i.e. loaded, part loaded, ballast) of cargo(s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General description of cargo(s)</td>
</tr>
</tbody>
</table>
CLASSIFICATION FOR CAUSE

Notes:

1. Where incident involves more than one type of casualty then entry should indicate sequence, i.e. a collision leading to fire and foundering should read "1-5-3".

2. Enter primary cause and, when appropriate, any secondary cause.

CODES FOR TYPE OF CASUALTY

1. Collision and Contacts
2. Strandings and Groundings
3. Floodings and Foundering
4. Lists and Capsizings
5. Fires and Explosions
6. Hull and Machinery Damage
7. Other
8. Unknown

CODES FOR CAUSE OF CASUALTY

Personnel faults
01: Failure to comply with Regulations
02: Failure to obtain ship's position or course
03: Improper watchkeeping or lookout
04: Improper maintenance
05: Incorrect operation
06: Failure to secure closing arrangements
07: Improper stowage of cargo
08: Improper loading or overloading
09: Incorrect ballasting
10: Negligence
11: Illicit smoking or use of smoking materials or uncontrolled use of heat source
12: Inadequate training
13: Unable to fulfil duties
19: Other

Failure of ship, its machinery or equipment
20: Propulsion machinery
21: Essential ancillary machinery
22: Steering gear
23: Navigational or communication equipment
24: Closing arrangements
25: Structural failure
26: Hull fittings or shaft seals
27: Subdivision arrangements
28: Bilge pumping
29: Spontaneous combustion
30: Component failure
39: Other
### Cause of casualty

<table>
<thead>
<tr>
<th>(ascertained/probable)**</th>
<th>Code for casualty*</th>
<th>Code for cause*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary</td>
<td>Secondary</td>
</tr>
</tbody>
</table>

Indicate the form of investigation carried out (see note 2)

State principal findings:

State action taken:

State findings affecting international regulations:

Is a further investigation to be carried out? Yes/No**

If yes further information should be forwarded in due course

Signature and title of person providing information

Date

On behalf of

* See page 6
** Delete as appropriate
Not related to ship
40: Force of wind, tide or current
41: Failure to provide instructions, charts or nautical publications
42: Failure of aids to navigation
43: Uncharted obstruction
44: Weather damage
45: Faulty design or construction
46: Blame (in whole or part) attributed to third party
47: Arson

59: Other

99: Unknown

***
### ANNEX 8

SERIOUS CASUALTIES FOR 198

BY CATEGORY OF CASUALTY

<table>
<thead>
<tr>
<th>Type</th>
<th>Casualty Causes</th>
<th>Ships at Risk</th>
<th>Casualty Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Cargo Ships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulk/Oil Ships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tankers (includes chemical tankers)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passenger Ships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collisions and Contacts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steaming and Guzzling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floodings and Partial Losses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metals and Ships of Reefer Vessels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fires and Explosions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ball and Portulary Damage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANNEX II

INSPECTION RECORD OF SUEZ CANAL
CASUALTIES
<table>
<thead>
<tr>
<th>Kind of Casualty</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Collision</td>
<td></td>
</tr>
<tr>
<td>b. Stranding</td>
<td></td>
</tr>
<tr>
<td>c. Capsizing</td>
<td></td>
</tr>
<tr>
<td>d. Fire</td>
<td></td>
</tr>
<tr>
<td>e. Flooding</td>
<td></td>
</tr>
<tr>
<td>f. Engine Trouble</td>
<td></td>
</tr>
<tr>
<td>g. Propeller Trouble</td>
<td></td>
</tr>
<tr>
<td>h. Rudder Trouble</td>
<td></td>
</tr>
<tr>
<td>i. Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Submerged</td>
<td></td>
</tr>
<tr>
<td>b. Sinking</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date. Time of Occurrence</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td></td>
</tr>
<tr>
<td>Month</td>
<td></td>
</tr>
<tr>
<td>Day</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Place</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lat. ° ° ° N</td>
<td></td>
</tr>
<tr>
<td>Long. ° ° ° E</td>
<td></td>
</tr>
<tr>
<td>(Port Said + km, or Susq. km)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Causes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Erroneous Operation</td>
<td></td>
</tr>
<tr>
<td>(1) Negligent Lookout</td>
<td></td>
</tr>
<tr>
<td>(2) Unconfirmed Position</td>
<td></td>
</tr>
<tr>
<td>(3) Against Sailing Rule</td>
<td></td>
</tr>
<tr>
<td>(4) Unskilled Maneuvering</td>
<td></td>
</tr>
<tr>
<td>(5) Unconfirmed Navigation Aids</td>
<td></td>
</tr>
<tr>
<td>(6) Unconfirmed Compass Error</td>
<td></td>
</tr>
<tr>
<td>(7) Unconfirmed Bilge</td>
<td></td>
</tr>
<tr>
<td>(8) No Chance to Evacuate</td>
<td></td>
</tr>
<tr>
<td>(9) Negligence of Weather and Sea Condition</td>
<td></td>
</tr>
<tr>
<td>(10) Icing</td>
<td></td>
</tr>
<tr>
<td>(11) Non-Equipped with Hydrographic Books</td>
<td></td>
</tr>
<tr>
<td>(12) Faulty Maintenance of Hull and Other Equipment (excluding Engine)</td>
<td></td>
</tr>
<tr>
<td>(13) Insufficient Preparation for High Seas</td>
<td></td>
</tr>
<tr>
<td>(14) Misselection Anchorage Position</td>
<td></td>
</tr>
<tr>
<td>(15) Insufficient Hydrographic Research</td>
<td></td>
</tr>
<tr>
<td>(16) Dazing while at Hela</td>
<td></td>
</tr>
<tr>
<td>(17) Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use of Engine</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(21) Bad Maintenance</td>
<td></td>
</tr>
<tr>
<td>(22) Mishandling</td>
<td></td>
</tr>
<tr>
<td>(23) Incompletely Repair</td>
<td></td>
</tr>
<tr>
<td>(24) Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Loading</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>(31) Misloading</td>
<td></td>
</tr>
<tr>
<td>(32) Mishandling Cargo</td>
<td></td>
</tr>
<tr>
<td>(33) Over-Loading</td>
<td></td>
</tr>
<tr>
<td>(34) Over-Peopled</td>
<td></td>
</tr>
<tr>
<td>(35) Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fire-Flammable Items</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>(41) Miscare of Flammable</td>
<td></td>
</tr>
<tr>
<td>(42) Short-Circuit</td>
<td></td>
</tr>
<tr>
<td>(43) Miscare of Dangerous Cargo</td>
<td></td>
</tr>
<tr>
<td>(44) Miscare of Oil(excluding(43) )</td>
<td></td>
</tr>
<tr>
<td>(45) Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality of Material and Structure</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>(51) Old and Decay</td>
<td></td>
</tr>
<tr>
<td>(52) Badness of Quality</td>
<td></td>
</tr>
<tr>
<td>(53) Structural Failure</td>
<td></td>
</tr>
<tr>
<td>(54) Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Irresistible Force</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>(61) Spontaneous Combustion</td>
<td></td>
</tr>
<tr>
<td>(62) Fault of Other Vessels</td>
<td></td>
</tr>
<tr>
<td>(63) Bad Port &amp; Harbour Facility</td>
<td></td>
</tr>
<tr>
<td>(64) Abnormal Weather</td>
<td></td>
</tr>
<tr>
<td>(65) Dead Missing &amp; Tounded Crew Members</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unknown Causes</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>(70) Unknown Causes</td>
<td>(80) Other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis of Collision Accident</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interference by Other Vessels</td>
<td></td>
</tr>
<tr>
<td>(1) None</td>
<td></td>
</tr>
<tr>
<td>(2) Navigating in Same Direction</td>
<td>Head-on</td>
</tr>
<tr>
<td>(3) Head-on</td>
<td></td>
</tr>
<tr>
<td>(4) Crossing</td>
<td></td>
</tr>
<tr>
<td>(5) Vessel Engaged in Fishing (Independently)</td>
<td></td>
</tr>
<tr>
<td>(6) Vessels Engaged in Fishing (plural)</td>
<td></td>
</tr>
<tr>
<td>(7) Other</td>
<td></td>
</tr>
</tbody>
</table>
### Inspection Record of Suez Casualty

#### I. Property of Vessel Which Met with Casualty

<table>
<thead>
<tr>
<th>1. Name of Vessel</th>
<th>Gross Tonnage</th>
<th>Length Over All</th>
<th>Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Principal Items</th>
<th>Breadth</th>
<th>Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Official Number</th>
<th>Uses</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description and Amount of Cargo on Board</th>
<th>( ) (K/T)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Port of Registry</th>
<th>Nationality</th>
<th>State(Prefecture)</th>
<th>Port</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Owner of Vessel</th>
<th>Name &amp; Others(etc.)</th>
<th>Flag</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Operator of Vessel</th>
<th>Name &amp; Others(etc.)</th>
<th>Flag</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Number of Crew (Number of People on Board)</th>
<th>Total Number</th>
<th>Persons</th>
<th>Number of Dead</th>
<th>Persons</th>
<th>Number of Missing</th>
<th>Persons</th>
<th>Number of Wounded</th>
<th>Persons</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Draft of Occurrence of Accident</th>
<th>Fore</th>
<th>Meters</th>
<th>Aft</th>
<th>Meters</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Speed</th>
<th>Cruising Speed</th>
<th>Kts</th>
</tr>
</thead>
</table>

|-----------------------|-----------|------------------------|------------|--------|

<table>
<thead>
<tr>
<th>Situation</th>
<th>Direction of Proceeding</th>
<th>a. North Bound</th>
<th>b. South Bound</th>
<th>Choice</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Speed of Convoy</th>
<th>kts</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Position in Convoy</th>
<th>from Forward</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Composition of Convoy by Type of Ships</th>
<th>Passenger Vessel</th>
<th>Vessels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cargo Vessel</td>
<td>Vessels</td>
</tr>
<tr>
<td></td>
<td>Tanker</td>
<td>Vessels</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>Vessels</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Vessels</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plan Composition of Convoy (Plot Your Position in Convoy)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Distance between You and (to) Forward Vessel</th>
<th>Meters</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Forward, Backward</th>
<th>(to) Backward Vessel</th>
<th>Meters</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Time Interval between your (to) Forward Convoy and Forward, Backward (to) Backward Convoy</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis of Collision Accident</td>
<td>Radar</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auto Pilot</td>
</tr>
<tr>
<td></td>
<td>Remote Control</td>
</tr>
<tr>
<td></td>
<td>Speed just before Collision</td>
</tr>
<tr>
<td></td>
<td>Number of Duty</td>
</tr>
<tr>
<td></td>
<td>Measure for Avoidance just before Collision</td>
</tr>
<tr>
<td></td>
<td>Meeting Situation</td>
</tr>
<tr>
<td></td>
<td>Stand-on or Give-Way Situation</td>
</tr>
<tr>
<td></td>
<td>Opposite Vessel</td>
</tr>
<tr>
<td></td>
<td>Opposite Object</td>
</tr>
</tbody>
</table>
### Analysis of Stranding Accident

<table>
<thead>
<tr>
<th>Feature</th>
<th>Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interference by Other Vessels</strong></td>
<td>(1) None (2) Navigation in Same Direction (3) Head-on (4) Crossing (5) Vessel Engaged in Fishing (independently) (6) Vessels Engaged in Fishing (plural) (7) Other</td>
</tr>
<tr>
<td><strong>Radar</strong></td>
<td>(1) Non-equipped (2) In Use (3) Not in Use (4) Unknown If in Use (5) Unknown If Equipped</td>
</tr>
<tr>
<td><strong>Auto Pilot</strong></td>
<td>(1) Non-equipped (2) In use (3) Not in Use (4) Unknown If in Use (5) Unknown If Equipped</td>
</tr>
<tr>
<td><strong>Remote Control</strong></td>
<td>(1) Non-equipped (2) In Use (3) Not in Use (4) Unknown If in Use (5) Unknown If Equipped</td>
</tr>
<tr>
<td><strong>Speed just before Stranding</strong></td>
<td>(1) Moving A stern (2) 0 Knot (3) 0-2 (4) 2-4 (5) 4-6 (6) 6-8 (7) 8-12 (8) 12-16 (9) 16-20 (10) 20-25 (11) 25 or More (12) Unknown</td>
</tr>
<tr>
<td><strong>Number of Duty Person on Deck</strong></td>
<td>(1) 1 Person (2) 2 Persons (3) 3 Persons (4) 4 Persons (5) 5 or More (6) None (7) Unknown</td>
</tr>
<tr>
<td><strong>Measure for Avoidance just before Stranding</strong></td>
<td>(1) Reducing Speed (2) Steering Wheel (3) (1) &amp; (2) (4) Signal for Reducing (5) Signal for Steering Wheel (6) (4) &amp; (5) (7) None (8) Unknown</td>
</tr>
<tr>
<td><strong>Place of Stranding</strong></td>
<td>(1) Bank (2) Shallow Water (3) Other</td>
</tr>
</tbody>
</table>

### Analysis of Fire Accident

<table>
<thead>
<tr>
<th>Feature</th>
<th>Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Source of Fire</strong></td>
<td>(1) Cigarette and Match (2) Cooking Appliance (3) Heating systems (4) Electric Instruments (5) Piping Systems (6) Welding or Cut (7) Spontaneous Combustion (8) Suffered from a Spreading Fire (9) Other (10) Unknown</td>
</tr>
<tr>
<td><strong>Objection of Ignition</strong></td>
<td>(1) Leakage Oil (2) Waste Cloth (3) Bilge (4) Ignitables-U ses (5) Gun Powder etc. (6) Loading Cargo (7) Structure &amp; Furniture (8) Other (9) Unknown</td>
</tr>
<tr>
<td><strong>Place of Occurrence</strong></td>
<td>(1) Bridge (2) Engine Room (3) Radio Operating Room (4) Room for Crew (5) Room for passenger (6) Office Room (7) Mess Room (Room for Cooking) (8) Dining Room (9) Hold for Cargo (10) Storage (11) Other (12) Unknown</td>
</tr>
</tbody>
</table>
### III. Weather Condition & Conduct of Casualty

#### Weather Condition

<table>
<thead>
<tr>
<th>Weather Condition</th>
<th>(1) Fine</th>
<th>(2) Cloudy</th>
<th>(3) Rain</th>
<th>(4) Fog</th>
<th>(5) Sand Storm</th>
<th>(6) Other</th>
<th>(7) Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Visibility

<table>
<thead>
<tr>
<th>Visibility Class</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>0-50m</td>
<td>50-200</td>
<td>200-500</td>
<td>500-1km</td>
<td>1km-2</td>
</tr>
<tr>
<td>Class</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Tide and Current

<table>
<thead>
<tr>
<th>Current (360° Form)</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>less than 0.3m/s</td>
</tr>
<tr>
<td></td>
<td>0.3-1.6</td>
</tr>
<tr>
<td></td>
<td>1.6-3.4</td>
</tr>
<tr>
<td></td>
<td>3.4-5.5</td>
</tr>
<tr>
<td></td>
<td>5.5-8.0</td>
</tr>
<tr>
<td></td>
<td>8.0-10.8</td>
</tr>
<tr>
<td></td>
<td>10.8-13.9</td>
</tr>
<tr>
<td></td>
<td>13.9-17.2</td>
</tr>
<tr>
<td></td>
<td>17.2-20.8</td>
</tr>
</tbody>
</table>

#### Wind

<table>
<thead>
<tr>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>less than 0.3m/s</td>
</tr>
<tr>
<td>0.3-1.6</td>
</tr>
<tr>
<td>1.6-3.4</td>
</tr>
<tr>
<td>3.4-5.5</td>
</tr>
<tr>
<td>5.5-8.0</td>
</tr>
<tr>
<td>8.0-10.8</td>
</tr>
<tr>
<td>10.8-13.9</td>
</tr>
<tr>
<td>13.9-17.2</td>
</tr>
<tr>
<td>17.2-20.8</td>
</tr>
</tbody>
</table>

#### Wave

<table>
<thead>
<tr>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

#### Swell

<table>
<thead>
<tr>
<th>Swell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>No Swell</td>
</tr>
</tbody>
</table>

#### Direction

<table>
<thead>
<tr>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-9</td>
</tr>
<tr>
<td>9-14</td>
</tr>
<tr>
<td>14 or More</td>
</tr>
</tbody>
</table>

#### Direction

<table>
<thead>
<tr>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-9</td>
</tr>
<tr>
<td>9-14</td>
</tr>
<tr>
<td>14 or More</td>
</tr>
</tbody>
</table>

---
<table>
<thead>
<tr>
<th>Analysis of Engine Trouble &amp; Propeller Trouble</th>
<th>Broken Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) Shaft Systems (2) Cylinder Systems (3) Starting Systems</td>
</tr>
<tr>
<td></td>
<td>(4) Fuel Oil Systems (5) Lubricating Oil Systems (6) Cooling</td>
</tr>
<tr>
<td></td>
<td>(9) Other ( ) (10) Unknown</td>
</tr>
<tr>
<td>Damage(Hull)</td>
<td>(1) Total Loss (2) Serious Damage (3) Half Damage</td>
</tr>
<tr>
<td></td>
<td>(4) Slightly Damage (5) None (6) Unknown</td>
</tr>
<tr>
<td>Leakage Oil</td>
<td>Description</td>
</tr>
<tr>
<td></td>
<td>(1) Crude (2) Heavy Oil (3) Lubricating Oil (4) Light Oil</td>
</tr>
<tr>
<td></td>
<td>(5) Lantern Oil (6) Gasoline (7) Bilge (8) Other</td>
</tr>
<tr>
<td></td>
<td>Amount</td>
</tr>
<tr>
<td>Outline of Casualty</td>
<td></td>
</tr>
</tbody>
</table>
### Conduct of Casualty

#### 1. Conduct of Engaged Vessels and Planes etc.

- **Government or Public Vessel**
  - (1) Police
  - (2) Fire Service
  - (3) Force (Navy, etc.)
  - (4) Other

- **Type of Vessels above Mentioned**
  - (1) Naval Vessel
  - (2) Salvage Boat
  - (3) Fighting Vessel
  - (4) Oil Recovery Boat
  - (5) Other

- **Private Vessel**
  - (1) Salvage Boat
  - (2) Fighting Vessel
  - (3) Merchant Vessel
  - (4) Fishing Boat
  - (5) Other

- **Air Plane**
  - (1) Police
  - (2) Fire Service
  - (3) Force (Navy, etc.)
  - (4) Other

- **Used Material for Removal of Spilled Oil**
  - (1) Oil-Fence
  - (2) Oil Dispersant
  - (3) Oil Absorbent
  - (4) Chemical Extinguisher
  - (5) Other

- **Spent Days (Days)**
- **Engaged Vessels (Vessel-Days)**
- **Planes (Plane-Days)**

### Outline of Conducts of Casualty

1. **Conduct of Damaged Vessels**

2. **Conduct of Damaged Facilities**

### Conditions of Indirect Suffering for the Area along the Canal
<table>
<thead>
<tr>
<th>Description of Casualty</th>
<th>Effect of Casualty</th>
<th>1. Description of Information</th>
<th>2. Hostile or Non-Hospital</th>
<th>3. Duration of Casualty</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Search</td>
<td>(1) Required to Repair</td>
<td>(1) Extent of Damage</td>
<td>(2) No</td>
<td>(1) Yes</td>
</tr>
<tr>
<td>(2) Paving</td>
<td>(2) No</td>
<td>(1) Extent of Damage</td>
<td>(2) No</td>
<td>(2) No</td>
</tr>
<tr>
<td>(3) Master</td>
<td></td>
<td>(1) Extent of Damage</td>
<td></td>
<td>(2) No</td>
</tr>
<tr>
<td>(4) Destruction</td>
<td></td>
<td>(1) Extent of Damage</td>
<td></td>
<td>(2) No</td>
</tr>
<tr>
<td>(5) Impairment</td>
<td></td>
<td>(1) Extent of Damage</td>
<td></td>
<td>(2) No</td>
</tr>
<tr>
<td>(6) Injury to Person</td>
<td></td>
<td>(1) Extent of Damage</td>
<td></td>
<td>(2) No</td>
</tr>
<tr>
<td>(7) Injured to Patient</td>
<td></td>
<td>(1) Extent of Damage</td>
<td></td>
<td>(2) No</td>
</tr>
<tr>
<td>(8) Fire</td>
<td></td>
<td>(1) Extent of Damage</td>
<td></td>
<td>(2) No</td>
</tr>
<tr>
<td>(9) Explosion</td>
<td></td>
<td>(1) Extent of Damage</td>
<td></td>
<td>(2) No</td>
</tr>
<tr>
<td>(10) Removal of Oil</td>
<td></td>
<td>(1) Extent of Damage</td>
<td></td>
<td>(2) No</td>
</tr>
<tr>
<td>(11) Other</td>
<td></td>
<td>(1) Extent of Damage</td>
<td></td>
<td>(2) No</td>
</tr>
</tbody>
</table>

2. Whether any Facilities

3. Nature of Casualty

4. Channel of Command

5. Name of Managing Authority

6. Nature of Channel

7. Nature of Occurrence

8. Description of Casualty

9. Extent of Occurrence

10. Nature of Vessels

11. Nature of Channel

12. Nature of Accident

13. Nature of Casualty

14. Nature of Vessel

15. Nature of Accident
1. Cahill, Richard A.

2. Cahill, Richard A.

3. Cashman, J.P.
   1977, WEMT Executive Committee.

4. Chadwick, W.A.
   Marine Casualties and How to Prevent them; The Institute of Marine
   Engineering; Joint meeting with the Nautical Institute; 30 October

5. Coverly, Joe
   Marine Accident Investigation; "A Government Surveyors Perspective"
   Paper "Seminar in Malmö 8-9 May 1986"
   "International Conference of Ships Safety and Marine Surveying".

6. Cowley, J.
   National Administration for Safety and Pollution Prevention Control;
   Paper "Seminar on Survey and Certification" IMO
   Tokyo; Japan 6-10 October 1980.

7. Det Norske Veritas Research Division
   Cause Relationships of Collisions and Groundings; Statistical Survey
   of Collisions and Groundings for Norwegian Ships for the Period of
   Report No.: 80-0199; Oslo 1980.

8. Durham, C.F.
   (Fair Play Books).
9. Hansen, Hans Richard
Structural Design: Safety and Reliability Considerations behind the Development of Classification Society Requirements.
Safety at Sea
WEMT Executive Committee 1977.

10. I C S / O C I M F / I A P H Publication

11. Institute of Shipping Economics and Logistics, Bremen

12. International Chamber of Shipping
Navigational Casualty Report Scheme; Report No. 15
Tanker Casualty Exchange Scheme; Report No. 16

13. IMO
Analysis of Serious Casualties to Sea-going Tankers; 1968-1982.

14. IMO
Analysis of Serious Casualties to Tankers; 1978-1984

15. IMO
Investigation into Serious Casualties.
MSC 50/15.

16. Kaps, H.
Ship Dynamics and Safe Transport of Cargo.
Lectures Given in W.M.U.; 1985 Malmö.

17. Lindfelt, Laris
Maritime Investigation Procedures and Techniques Insurance Companies View on Accident Prevention and Accident Investigation; The Swedish Club.
18. Lloyd's Register of Shipping  


20. National Transportation Safety Board  
Marine Accident Report No. 205 94  
U.S.A. Government

21. Nautical Institute and Institute of Marine Engineering  
Marine Inquiries and Casualty Investigation  

22. P.S. Vanchiswar  
Establishment administration of Maritime Affairs in Developing Countries; Vol. I and II.  

23. Richardson, J.  
Total Loss: Some Possible Causes;  
The Journal of Nautical Institute; April 1986 p 11.

24. Rother, D.  
Ship Casualties and Analysis of Causes and Circumstances;  
Institute of Shipping Economics (Bremen)

25. Rowntree, Derek  
Developing Courses for Students; 1981.

26. Rutherford, D.  
Ship Safety Personnel Role and Duties.
27. **Steen, Goran**  
Maritime Accident Investigation. Chairman of The Board of Accident Investigation, Sweden.

28. **Swedish Ministry of Transport and Communications**  

29. **Verlo, G. and Drager, K.H.**  
Evaluation of Asteering System Through a Failure Mode and Effect Analysis.  

30. **Zade, Gunther**  
Introduction to Safety of Navigation.  
W.M.U. Malmö; 1985 (Lectures).
REFERENCE

1. Department of Transportation
   Coast Guard (U.S.A.) (CG. 495)

2. International Civil Aviation
   Course and Seminar in Aviation Accident Prevention
   Post-Mishap Investigation Techniques

3. International Civil Aviation Organization
   Manual of Air Craft Accident Investigation
   Doc. 6920 - ANI 855/4