MARINE EMERGENCIES
FOR MASTERS AND MATES

D.J. HOUSE
# Contents

*Acknowledgements*  
About the Author  
Abbreviations  
Terminology and Definitions Associated with Marine Emergencies  

## 1 Collision (Ship to Ship) at Sea  
1 Introduction  
2 Collision: Immediate Effects  
3 Impact Damage  
4 Legal Actions of the Master (Under the Merchant Shipping Act)  
5 General Actions Following Initial Response to a Collision  
6 Incorporation and Use of Checklists  
7 Communications Following a Collision  
8 Voyage Data Recorder (Black Box Recorder)  
9 Note of Protest  
10 The Role of the Ship’s Chief Officer (in the Aftermath of Collision)  
11 Collision Patch Construction  
12 Collision Patch Materials  
13 Port of Refuge  
14 Port of Refuge and General Average  
15 Damage Control Parties  
16 Passenger Ship Collision  
17 Tanker Collision  
18 Collision: Typical Damage/Repair Assessment (Hypothetical)  
19 Summary  

## 2 Taking the Ground: Grounding, Beaching, Stranding and Docking  
20 Introduction  
21 Running Aground  
22 Incident Report: Loss of the *Riverdance*  
23 Incident Report: *MSC Napoli* (Container Vessel)  
24 Beaching  
25 Grounding/Beaching Summary
Case Study: Running Aground 35
Immediate Actions 36
Soundings and Use of Lead Line 37
Emergency Dry Docking 39

3 The Lee Shore and the Use of Emergency Anchors 49
Introduction 49
What is the Lee Shore? 50
Loss of Steering 50
Steering Gear Operations 51
Lee Shore: Loss of Main Engine Power 57
Master’s Options 57
Relevant Anchor Work 59
Example Stern/Kedge Anchor 70
Kedge Anchor 71
Chain Cable/Stud Link: General Information 72
Heavy Weather Encounter 73
Case Study: The Loss of the M.V. Braer (89,730 dwt) 78

4 Fire on Board 81
Introduction 81
The Outbreak of Fire on Board the Ship 82
Fire Support Units 84
Fire Parties 84
Firefighting Teams 85
CO₂ Maintenance 86
Security against Accidental Release of CO₂ 87
Example Fires 87
Case Incident 92

5 Abandonment 105
Introduction 105
Loss of the Ship 106
The Aftermath of the Herald of Free Enterprise 107
The Loss of Costa Concordia, Passenger Cruise Ship 107
Abandonment Psychology 113
Passenger Behaviour 117
Incident Report 118
Exposure to Risk 118
Evacuation by Free Fall Lifeboat 120
Totally Enclosed Lifeboats 121
6 Marine Pollution

Introduction 137
Terminology and Definitions affecting Tanker and Gas Carrier Vessels 138
Pollutants Other than Oils 145
The Causes of Maritime Pollution 146
The Design of the Oil Tanker 148
Oil Tankers 149
Pipeline Connections 150
Anti-Pollution Measures 150
Oil Spills 151
Exxon Valdez, 23 March 1989 152
Lightening Operations (Ship-to-Ship Transfer) 153
Ship-to-Ship Oil Transfer 154
Recovery of Floating Oil Pipelines 155
Oil Movement 157
Incident Report: Grounding of the Drilling Rig Kulluk, 30 December 2012 158
Oil Recovery Equipment 158
Ballast Water Movement 159

7 Towing and Salvage Hazards

Introduction 161
Tug Operations 162
Harbour and Port Authority Tugs 163
Oceangoing Salvage Tugs 163
The Work of the Towmaster 164
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tugs and Emergency Towing</td>
<td>165</td>
</tr>
<tr>
<td>Tug Approval Surveys</td>
<td>166</td>
</tr>
<tr>
<td>Cargo Deck Barges (Pontoons)</td>
<td>169</td>
</tr>
<tr>
<td>The Insurable Risk</td>
<td>169</td>
</tr>
<tr>
<td>Sheer Legs in Salvage Use</td>
<td>172</td>
</tr>
<tr>
<td>Salvage Contact</td>
<td>173</td>
</tr>
<tr>
<td>Quality of Information</td>
<td>176</td>
</tr>
<tr>
<td>8 Miscellaneous and Routine Leading to Potential Hazards</td>
<td>177</td>
</tr>
<tr>
<td>Introduction</td>
<td>177</td>
</tr>
<tr>
<td>Enclosed Space Entry</td>
<td>177</td>
</tr>
<tr>
<td>Fog Encounter</td>
<td>178</td>
</tr>
<tr>
<td>Dangers Associated with Restricted Visibility</td>
<td>179</td>
</tr>
<tr>
<td>Doubling Watches</td>
<td>180</td>
</tr>
<tr>
<td>Ice Navigation</td>
<td>181</td>
</tr>
<tr>
<td>Man Overboard (MoB)</td>
<td>183</td>
</tr>
<tr>
<td>Example Turning Manoeuvres</td>
<td>184</td>
</tr>
<tr>
<td>Rescue Boat Activity</td>
<td>186</td>
</tr>
<tr>
<td>Boarding or Disembarking Marine Pilots</td>
<td>186</td>
</tr>
<tr>
<td>Navigational Pitfalls of ECDIS</td>
<td>187</td>
</tr>
<tr>
<td>Search Patterns Associated with IAMSAR</td>
<td>188</td>
</tr>
<tr>
<td>Determination of Track Space</td>
<td>190</td>
</tr>
<tr>
<td>Duties of the On-Scene Coordinator</td>
<td>191</td>
</tr>
<tr>
<td>Example Checklists</td>
<td>192</td>
</tr>
<tr>
<td>The Activities of the US Coast Guard</td>
<td>193</td>
</tr>
<tr>
<td>Emergency Communications</td>
<td>194</td>
</tr>
<tr>
<td>The Use of Distress Signals</td>
<td>196</td>
</tr>
</tbody>
</table>

**Annex 1: Question and Suggested Answers for Senior Officers: Towards Marine Examinations**

<table>
<thead>
<tr>
<th>Annex</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Annex 1: Question and Suggested Answers for Senior Officers: Towards Marine Examinations</td>
<td>199</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annex</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annex 2: Notable Shipping Incidents</td>
<td>211</td>
</tr>
<tr>
<td>Annex 3: Lloyd’s Standard Form of Salvage Agreement: No Cure - No Pay</td>
<td>213</td>
</tr>
<tr>
<td>Annex 4: Lloyd’s Standard Form of Salvage Agreement: Salvage and Arbitration Clauses</td>
<td>219</td>
</tr>
<tr>
<td>Annex 5: Lloyd’s Standard Form of Salvage Agreement: Procedural Rules</td>
<td>225</td>
</tr>
<tr>
<td>Annex 6: International Salvage Union: Sub-contract (Award Sharing) 2001</td>
<td>227</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary</td>
<td>235</td>
</tr>
<tr>
<td>Bibliography</td>
<td>237</td>
</tr>
<tr>
<td>Index</td>
<td>239</td>
</tr>
</tbody>
</table>
2

Taking the Ground

Grounding, Beaching, Stranding and Docking

Introduction

For a vessel to take the ground accidentally or intentionally is clearly not the ideal for a unit which is fundamentally designed to remain afloat. Most incidents of taking the ground could expect to lead to bottom damage to the hull, depending on the nature and the quality of the sea bottom.

In an incident where a ship runs aground accidentally, ships personnel would have to be concerned with the general arrangement of the vessel. The condition of the machinery space, for instance, is usually in a low-lying position and leaves it exposed to flooding. Any water ingress to the engine room could be expected to affect the ship’s power supply very quickly thereafter.

Similarly, the ship’s double-bottom tanks, often employed for fuel storage, are also generally situated low down, on either side of the keel. Seagoing personnel become familiar with the ships they sail on. Consequently, most would be aware that with fuel tanks lying low in the ship’s hull the risk of pollution is real in the event that these double-bottom tanks are breached during a grounding incident.

Seafarers generally do not choose to take the ground and would never desire to take a rock-infested ground. Soft sand would be a better alternative in order to limit damage, in the event of being given a choice. Such a choice may present itself where a ship is deliberately forced into a shallow area, a process known as 'beaching'. This is a deliberate act usually carried out to prevent a total constructive loss of the vessel. Such a circumstance could occur, say, following a collision in which a ship is so badly damaged that she could sink. Beaching the vessel deliberately could save the ship from going down and becoming a total loss.

Whether running aground accidentally or deliberately beaching a ship, the incident is still an act of taking the ground, a totally alien situation for a vessel to find herself in.
Such a scenario is one that mariners may have to respond to at any time of the day or night if involved in an incident. What actions would the ship’s Master have to adopt if the ship takes the ground? What actions would be expected of the Officer of the Watch and what would be expected of Chief Officers, Chief Engineers and other members of the crew?

Running Aground

Running aground is defined by a ship which strikes the sea bed and has no under-keel clearance. Running aground is accidental, whereas ‘beaching’ occurs where a ship takes the ground deliberately. A vessel can have a soft landing or a bad landing in a grounding scenario. These are usually separated by the amount of damage incurred to the vessel as it runs aground and will be clearly influenced by the nature of the sea bottom.

In any event, ships don’t run aground in deep water. They run aground in shallows when their draught is too great for the available depth of water. The majority of groundings take place through poor navigation in restricted waters. Alternatively, if a ship experiences a power loss and subsequent black-out, the prevailing weather can cause the vessel to be blown aground (as in the case of the Riverdance).

There have been several high-profile disasters due to grounding incidents. The Finnish cruise ship Sally Albatross ran aground in the Baltic Sea in ice-covered conditions (March 1994); 1,250 passengers and crew were landed on the ice by a marine evacuation system (MES). This was the first time an MES had been deployed in anger. The grounding was put down to poor monitoring of the ship’s position – in other words, questionable navigation practice.

The Ulster Sportsman, a ro-ro ferry en route from Ardrossan, Scotland, to Loch Larne in Northern Ireland ran aground at 16 knots, into the cliff face of the Irish coast. Although the keel was set back and concertined for about 1.5 metres, the main damage was to the bow. Fortunately, the collision bulkhead held the watertight integrity and prevented consecutive flooding. The ship, with tug assistance, was able to move to Belfast Dry Dock to effect repairs.

It should be realised that running aground generally occurs more frequently than collision. That is not to say a grounding incident is any less critical than a collision. The circumstances of a collision and respective damage incurred may be of a different nature and affect a different region of the ship compared to running aground. The seriousness and risk to life of both incidents could be similar.

In a situation in which the vessel runs aground, the duties of the Master and senior officers are more defined. As with a collision, the Master would move to the bridge and take the conn. He would
also order the chief officer to obtain an initial damage assessment containing exactly the same four elements of a collision damage assessment, namely:

1 watertight integrity of the hull;
2 engine room, wet or dry;
3 casualty report;
4 any pollution incurred.

Clearly, the emphasis on the state of the engine room and whether it is wet or dry will reflect the position of the machinery space as it is so low-lying in the ship’s structure. The same applies to the pollution observations, bearing in mind that fuel tanks are generally located in the double-bottom tanks, close to the structural region of contact.

Figure 2.1 The Maanav Star, a cargo vessel seen well aground in soft sand on a Sussex beach on the south coast of England. The vessel dragged her anchor and was subsequently blown ashore on 11 September 2004. After several unsuccessful attempts to refloat her the stranded vessel was finally refloated on 24 September with help from a Dutch tug.

Figure 2.2 The Maanav Star, aground as seen from astern.
Incident Report: Loss of the *Riverdance*

In January 2008 the ro-ro vehicle ferry *Riverdance* sailed on a short passage from Warren Point in Northern Ireland towards Heysham in Lancashire, England. This was a coastal journey she undertook daily. In the voyage across the Irish Sea the ship encountered some heavy seas and the ship’s Master reported that the vessel became disabled by an encounter with what he described as a ‘freak wave’, in a position 10 miles west-south-west of Fleetwood, an area known as ‘Shell Flat’.

The vessel lost power and steerage and listed to about 60° in the Morecambe Bay area. The cargo was caused to shift and the list settled to about 35°. The prevailing westerly weather caused the vessel to set down towards the north-west coastline of the United Kingdom. The Master generated a distress message and the four passengers and non-essential crew were evacuated by helicopter. The remaining crew members were later evacuated and the ship was allowed to remain at the mercy of the weather.

The *Riverdance* was subsequently driven aground on the Cleveleys beach, just north of Blackpool. The grounding initially did not appear to cause much additional damage as the vessel had landed on sandy, rock-free ground, with a gentle slope. First inspections led to an assumption that refloating the vessel was a distinct possibility. Although the region was tidal with 10 metre tides, it was still felt that the vessel could be refloated and saved.

The prevailing weather during February and March of that year remained unfavourable and the vessel, over a period of time, sank deeper into the sand.
All future hope of refloating the vessel seemed to be dropping away and a decision was made to salvage what cargo could be saved between tides.

A later decision, to accept the loss, was then made and the fuel oils within the vessel were recovered. Salvers were moved in to break the hull down by cutting it into moveable sections. This process lasted until September 2008 a period of over eight months.

**NB.** The sequence of illustrations in Figures 2.4–2.6 show the vessel on first landing. The daily tidal effects and ferocious bad weather restricted salvage activity. The depth that the bridge wing submerged into the sand and the final resting place are depicted. From the final rest position, bunkers, cargo and engines were removed, prior to cutting the hull into manageable, transportable sections.

Initially the vessel was expected to be refloated and salved with its cargo at an appropriate high tide. The schedule was subsequently hampered by inclement weather generating heavy seas and causing the vessel to heel over considerably onto her beam ends. Further attempts to recover the ship were considered, but again bad weather worked against the salvage teams and the ship settled deeper into the sand.

The *Riverdance* was finally declared a total constructive loss and salvage experts were left with no alternative but to cut the ship into moveable sections for scrap value. The salvage operation was conducted by the removal of some of the accessible deck cargo being removed shortly after the vessel foundered. However, the bulk of the cargo was removed by cutting holes into the ship’s side and craning cargo units clear of the hull prior to section cutting through the vessel.

Figure 2.4 The *Riverdance* ro-ro ferry buried in the sand north of Blackpool, England, prior to being cut into sections by salvage teams. Some idea of the depth that the hull is buried can be determined by the height of the exposed bridge wing seen above the surface.
Figure 2.5 The *Riverdance* seen aground and heeled to starboard surrounded by the incoming tide.

Figure 2.6 The *Riverdance* seen where the tidal water has receded. Some drop trailers are still seen under the accommodation structure on the upper vehicle deck.

Figure 2.7 The port side of the *Riverdance* seen in a setting position.

Figure 2.8 The *Riverdance* seen heeled over on her beam.

Figure 2.9 The *Riverdance* seen aground and with the starboard bridge wing settling deeper into the sand.
Incident Report: *MSC Napoli* (Container Vessel)

The *Napoli* experienced a hull failure after its departure from Antwerp on 17 January 2007. The vessel was outward bound on a course of 240° passing through the English Channel when she encountered large waves during the following day. A loud crashed or cracking sound was heard by the ship’s personnel and the engine room alarms activated. Subsequent investigation revealed that a hull crack had appeared in the forward engine room bulkhead. This fracture was later confirmed by a diving inspection.

With the vessel’s engine room flooding the Master, after consultation with the Chief Engineer and sighting cracks to the hull on either side, decided to abandon the ship. By 1125 hours the main electrical power had failed and the emergency generator had cut in automatically. The port lifeboat was prepared for launch because of the list on the vessel. Extra water, the SART and EPIRB were placed into the boat and the Master and Third Officer were the last to board the survival craft.

All 26 survivors were subsequently recovered by highline operations to two Sea King helicopters. After the rescue of the crew, the vessel was taken in tow towards Portland, Dorset. Concern increased regarding the condition of the disabled vessel as the operation approached the south coast of England. The possibility of the vessel breaking up or sinking became a real concern and it was decided to beach the ship in Branscombe Bay on 20 January 2007.

Some of the containers were lost on beaching the ship, but during the following five months the remaining containers were removed as was most of the ship’s fuel oil. The vessel was reflated on 9 July, but it became readily apparent that she was in a poor condition and was quickly re-beached three days later.

After considerable deliberation the decision was made to break the vessel in two and salvage each half. This was to be achieved by explosive charges set each side and forward of the bridge front in way of the original cracks in the hull. The two halves of the vessel where then taken to be scrapped in April 2008, the stern section to Holland and the bow section to Harland & Wolf shipyard in Belfast.

**NB.** The *MSC Napoli* was built by Samsung Heavy Industries of South Korea in 1991. Her beam was too large to allow passage through the Panama Canal. At the time of building she was one of the largest container vessels to be built, accommodating 2,318 containers, 700 of which were stowed on deck at the time of the incident.
Beaching

The act of deliberately running a vessel into shallow waters to take the ground has become known as ‘beaching’. The operation is usually only carried out to save the vessel from an even greater disaster like sinking and becoming a total constructive loss.

Ideal conditions for beaching a ship are usually very difficult to find all in one place and at the same time. Any Master finding himself/herself in such a predicament would expect to limit any additional damage to the hull by taking the ground. Hence, a soft, sandy beach must be considered the ideal position. The ground should preferably be rock-free, with a surf-free shore line.

Using limited speed, with maximum ballast on board, contact with the ground should be in daylight rather than during the hours of darkness. Beaching head first is expected because of the position of the collision bulkhead. Stern-first beaching would never be a recommended scenario because of the additional damage to rudders, propellers and hull that could be expected.
In terms of timing of a beaching operation, in relation to tides, it should not be on the top of high water of a spring tide. Beaching, if necessary, should occur at a mid-point between high water and low water on a falling tide. The vessel should avoid beaching on a rising tide because there remains the possibility that the vessel could be pushed further up the beach as the tide rises.

It should be borne in mind that beaching is a deliberate act and carried out with the view to refloating at a later date following repairs. If the vessel is pushed further inland by a rising tide, refloating may pose greater difficulties. It is recommended that

- Anchor Points Ashore
  - Boulders
  - Or large trees

Ideal Breaching Conditions
1. Daylight operation if possible.
2. Gentle, sloping beach.
3. Sandy beach, rock free.
4. Little or no surf.
5. Sheltered.
6. Clear of traffic.

Prevailling weather

Anti-slew preventer wire shackled to the ‘ganger length’ of the anchor cable

At reduced speed

Approach to beach to take any impact forward of the collision bulkhead

Preventer run to Anchor point ashore

Anti-pollution barrier

Approach to beach to take any impact forward of the collision bulkhead

Buoy

At reduced speed

Approach to beach to take any impact forward of the collision bulkhead

Anti-pollution barrier

Prepare weather anchor for letting go

Take on maximim ballast to maximise draught

Taking the ground forward of the ‘Collision Bulkhead’ is preferred. Once beached, take additional ballast if possible, to prevent the vessel accidentally refloating itself.

Figure 2.13 An approach to beaching.
once the keel has touched the ground, every effort to add further ballast weight to the ship should be made. This additional weight should limit unwanted movement of the hull to a position further inland. Additionally, both anchors should be walked back to stop the vessel accidentally refloating itself on a rising higher tide.

Once in a beached position in a tidal region, steps must be taken to prevent unwanted movement of the vessel by either tides or weather. Where moorings can be stretched and secured ashore these would act as anti-slewing, anti-movement retainers. Any future movement on the hull could only generate additional and unwanted damage to the vessel.

Improvisation remains one of the basic elements that stimulates so-called ‘good seamanship’. Moorings and steadying lines would need anchor points to secure to. These could be provided by stalwart trees, large embedded boulders or even man-made anchor points.

**Grounding/Beaching Summary**

Carry out a damage assessment following the action of the ship taking the ground. The damage assessment should initially cover:

- watertight integrity of the hull;
- engine room check, wet or dry;
- casualty report for injuries;
- pollution assessment.

Subsequent actions are:

- sound round all internal ship’s tanks;
- take a full external soundings with particular attention to the nature of the bottom and the forward and after end regions;
- deploy any remaining anchors;
- display aground signals as appropriate;
- seal the uppermost continuous deck (this should be achieved before taking the ground);
- maintain a deck patrol for fire and security;
- calculate the next high water/low water times and heights;
- investigate stability and refloating details following the instigation of repairs;
- prior to attempting to refloat, call in a ‘stand-by vessel’;
- ensure log book accounts are entered of all events.

Master’s advice (once on the ground):

- order a position to be placed on the chart;
- following damage assessment results, open up communications to relevant authorities, including the Coastguard;
• engage tug assistance if appropriate;
• investigate damage and stability criteria as soon as practical;
• make a report to the Marine Accident Investigation Branch (MAIB);
• investigate the nearest dry dock capacity/availability/facilities with owner’s assistance and/or instigate diver inspection;
• obtain a long-range weather forecast;
• monitor any ongoing repairs.

**NB.** Increased damage can be expected with any movement on the hull once the vessel has taken the ground. Any preventative measures, like the use of anti-slew wires and the deployment of anchors to reduce movement, are to be recommended.

Any change in direction of the prevailing weather as well as changes in tide heights can be expected to influence ship movement. Unless the ship is secured in position, a rising tide could cause the vessel to accidentally float off into deep water prior to instigated repairs being finished.

**NB.** It is imperative that an anti-pollution barrier is established around a damaged vessel. This can be achieved by obtaining designated boom equipment. If this is not available, then the use of floating mooring ropes could be employed as an improvised barrier.

**Case Study: Running Aground**

**Incident**

While on a voyage from Europe to Montreal during the winter of 1973, the container ship *M.V. Cast Beaver* (previously known as *Inishowen Head*) ran aground in fog just South of Quebec, in the St Lawrence river. Following a damage assessment, it was found that the underwater area of the hull of the vessel was seriously damaged, from stem to stern, after the ship had settled on a rocky river bed.

Although the watertight integrity, in way of the double bottoms, had been broached throughout the ship’s length, the collision bulkhead and the tank tops had remained intact and the ship’s positive stability had been retained.
Shipboard Actions

Immediately following the grounding incident the ship’s Chief Officer was ordered by the Master to carry out a damage assessment. His activity was somewhat hampered by snow-covered decks and an extremely low outside air temperature of –20°C.

Damage Assessment Content

Tank soundings revealed that all double-bottom tanks from No. 1s to No. 5s had been broached, but all cargo holds were dry. Visual inspection confirmed that tank tops were dry and cargo was undamaged. The engine room was dry but double bottoms containing fuel oil had been broached. This was also evident on the upper deck as fuel oil was being forced up air and sounding pipes by incoming water pressure. This oil content on the upper deck was visible from the navigation bridge. There were no injuries to crew and no signs of pollution overside.

Immediate Actions

The Master took the ‘conn’ of the vessel and made an immediate urgency call for tugs to assist either side of the vessel. He ordered a position to be placed on the navigation chart and obtained an updated weather forecast. The Chief Officer ordered the deck scuppers to be blocked off and ordered all crew members to observe a non-smoking ban. He then carried out a detailed stability assessment and reported to the Master that the vessel would remain afloat on the tank tops at a reduced but positive stability.

Subsequent Actions

Following urgent discussions with shore-side authorities, the availability of the Quebec dry dock was confirmed. This dock was seen as a suitable alternative to carrying out a detailed underwater inspection.

The ship was de-ballasted and an interim passage plan was established to move the damaged vessel, floating on tank tops, with tug assistance, towards the dry dock entrance. The shipping company and agents were informed and the vessel entered dry dock on 5 January 1974. The company superintendant made immediate plans to attend the ship in the Quebec dry dock.

The Dry Dock Operation

The ship supplied the dock with relevant documentation, i.e. dry dock plan, general arrangement and shell expansion plan. The
block pattern was set in place prior to the vessel entering the dock in the late evening.

Once the ship had become sewn on the blocks a scaffold enclosure was erected around the aft end. This was given a polythene surround and industrial heaters immediately brought in to keep an ambient temperature in the areas of the propeller and the tail shaft. These precautions proved necessary to prevent metal fractures in temperatures that were to drop below –30°C.

The First Morning

General inspection of the lower part of the hull revealed that shell plating from the garboard strake, either side of the keel, had been badly torn through the vessel’s length. Immediate activity started to crop away torn metal sections and fair others. The ship’s Second Officer was designated to take an account of all the new steelwork used to renew the damaged hull. This was a company requirement to determine the amount of new steelwork that would be needed to repair the damaged hull.

Aftermath

The hull was repaired in just over four weeks, after which the vessel was restored and refloated. She was able to continue onto Montreal, discharge and load her cargo and returned to her home port of Liverpool by the second week of March 1974. The estimated cost of this major repair was given as $2,000,000.

Soundings and Use of Lead Line

In virtually every case of grounding, two sets of soundings must be taken. The first is a full set of internal tank soundings, the other is external depth soundings. Some mariners might feel that the use of the hand lead is dated and would generally never be employed because in this day and age we have the benefit of excellent echo sounding, sonar and Doppler technology. In routine sailing operations such opinions would be right, but ‘smelling the bottom’ is not generally considered a routine operation for ships.

Where navigation historically led ships into shoal waters the hand lead was always used, the lead being swung from a position known as the chains. This operation of ‘swinging the lead’ was conducted when a vessel entered estuaries and engaged in river passages. It is in such positions, where shallows could be expected, that the vessel’s draught could be compromised.

A typical geographic example today could be found in and around the hinterland of Central American countries of El Salvador, Nicaragua and Costa Rica. Any vessel moving into estuaries’ could
Plate 1 The *Costa Concordia* cruise ship seen lying on its starboard side after striking the rocky outcrop of ‘Isola del Giglio’ off the Italian West Coast. The vessel is seen shortly after grounding and partial capsize with an anti-pollution boom/ floating barrier surround.
MARINE EMERGENCIES

D.J. HOUSE

An influential guide to marine emergencies and the current strategies that can be employed to cope with the immediate after-effects and ramifications of disaster at sea. Many mariners will at some point in their marine careers become involved in one sort of emergency or another, while in port or at sea, whether it is a fire on board, a collision with another vessel or an engine failure threatening a lee shore. Actions to take in such incidents can be the difference between survival and catastrophic loss.

This text provides a direct insight into some of the latest incidents and includes:

- case studies from emergencies worldwide
- checklists and suggestions for emergency situations
- everything from fire and collision right through to the legal implications of salvage.

D.J. House has written and published 18 marine titles, many of which are in multiple editions. After commencing his seagoing career in 1962, he was initially engaged on general cargo vessels. He later experienced worldwide trade with passenger, container, ro-ro, reefer ships and bulk cargoes. He left the sea in 1978 with a Master Mariner’s qualification and commenced teaching at the Fleetwood Nautical College. Retiring in 2012 after 33 years of teaching in nautical education, David House continues to research and write for the ever-changing marine industry.