OIL COMPANIES INTERNATIONAL MARINE FORUM

RESULTS OF A SURVEY INTO LIFEBOAT SAFETY

July 1994

The OCIMF mission is to be recognised internationally as the foremost authority on the safe and environmentally responsible operation of oil tankers and terminals.

The Oil Companies International Marine Forum (OCIMF) is a voluntary association of oil companies having an interest in the shipment and terminalling of crude oil and oil products. OCIMF is organised to represent its membership before, and consult with, the International Maritime Organization (IMO) and other government bodies on matters relating to the shipment and terminalling of crude oil and oil products, including marine pollution and safety.

INTRODUCTION

During the course of regular industry meetings, OCIMF members became aware of the disturbing frequency at which similar, and occasionally fatal, lifeboat incidents were occurring. This paper has been prepared by the Oil Companies International Marine Forum (OCIMF) to increase industry awareness of the repetitive pattern of these incidents and to propose countermeasures for consideration by relevant industry bodies.

The investigations described in this paper focus on davit launched fire protected totally enclosed lifeboats. Free-fall lifeboats are not specifically addressed in this paper but OCIMF notes that this type of boat can overcome some of the typical problems encountered with davit launched boats. However, OCIMF is also aware of the potential for accidental release of free-fall lifeboats and considers this issue must be adequately addressed to ensure that seafarers have complete confidence in this type of boat.

In recent years lifeboats have evolved into sophisticated pieces of equipment requiring extensive and meticulous maintenance. For the modern lifeboat most of this complexity revolves around legislative requirements such as onload release, hydrostatic interlocking, remote lowering control, etc., all of which are designed to enhance the crew's ability to evacuate the ship at a time of extreme distress. It is the view of OCIMF that the current legislative requirements for crew competency do not adequately address modern lifeboat maintenance and operation. Not withstanding the above remarks, ship owners and operators must also accept responsibility for ensuring the necessary level of competency are attained by those who operate their ships.

Recommendations and conclusions made in this paper are based on an industry survey conducted by OCIMF. The survey results demonstrated that most of the reported incidents occurred during drills and that there were three primary causes, namely; equipment failure, design fault, and human error. It could be argued that all the reported incidents were the result of human factors such as lack of proper training, poor seamanship, inadequate maintenance or the ergonomics of design. In order to focus on means of preventing future lifeboat incidents, OCIMF chose to probe deeper into the incident, beyond the apparently obvious human errors, in an attempt to identify the root causes.

1. LIFEBOAT INCIDENT SURVEY

To obtain data on lifeboat incidents, a questionnaire was developed and distributed world-wide to ship operators and national authorities through OCIMF, the International Chamber of Shipping (ICS) and selected flag State administrations. Ninety two incidents were reported when the survey period closed and a summary of the data is attached.

The information on each individual report was not always complete, therefore, the reader should not draw any conclusions from the fact that there are different numbers of incident totals in the various pie charts that follow (as indicated by the key figures in brackets). The relative proportion of each slice is considered to be the most significant factor.

2. WHEN LIFEBOAT INCIDENTS OCCUR

As expected, a large proportion of the reported lifeboat incidents occurred during drills. Almost half of the reported incidents occurred during the recovery of boats after drills and, in particular, during the process of lifting the boat from the water to the vicinity of the upper deck.

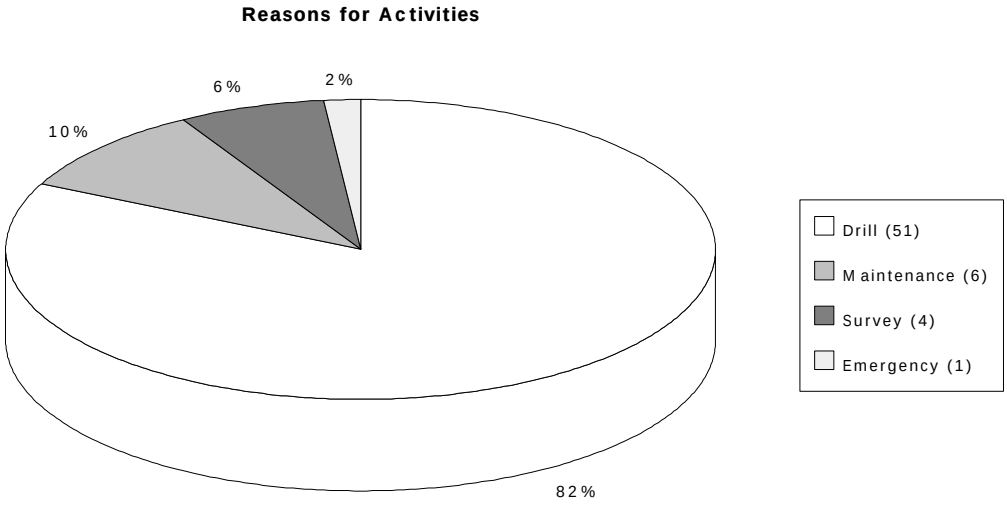

Fig 1.

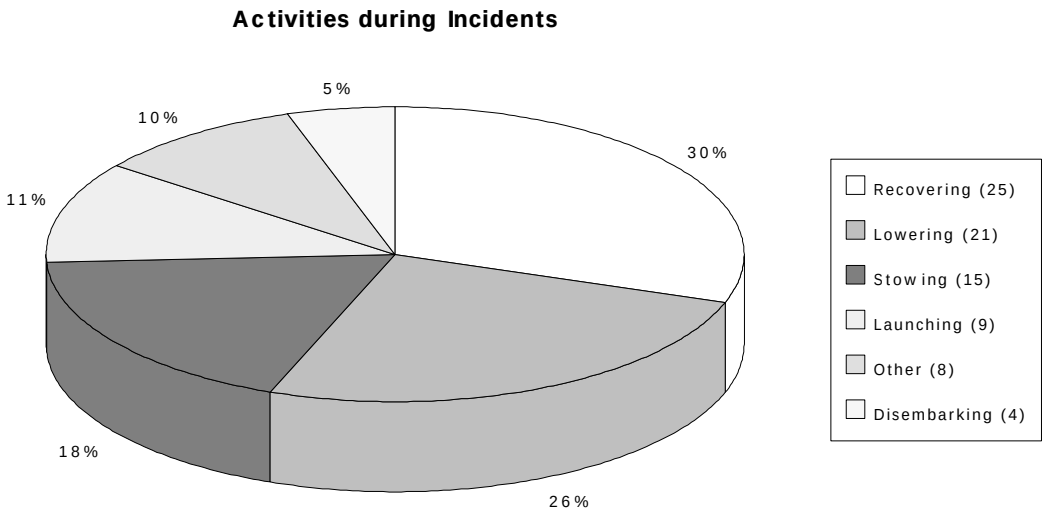

Fig 2.

3. WHY LIFEBOAT INCIDENTS HAPPEN

Equipment failures and design shortcomings were responsible for approximately two thirds of all reported lifeboat incidents. Human error accounted for most of the rest. Of those reported incidents attributed to hardware component failure, brakes, lifting hooks and quick release mechanisms were implicated in almost two thirds of the incidents.

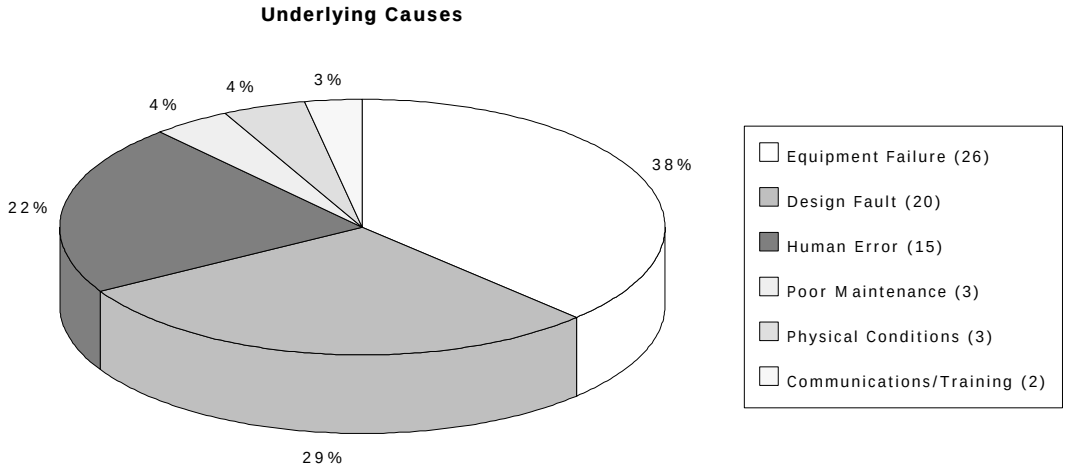

Fig 3.

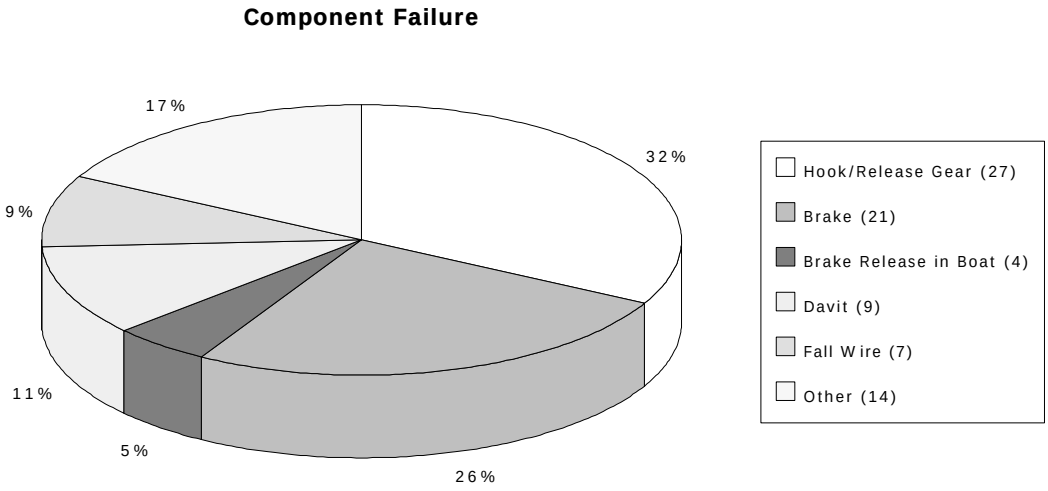

Fig 4.

4. THE CONSEQUENCES

Almost half of the reported lifeboat incidents resulted in injury to personnel. Two such incidents, both of which related to the hook/release gear, resulted in four fatalities. OCIMF interviewed many mariners during the survey and discovered a surprising lack of confidence in modern lifeboats which is causing some reluctance on the part of ship crews to conduct the necessary lifeboat drills intended to help them protect their lives.

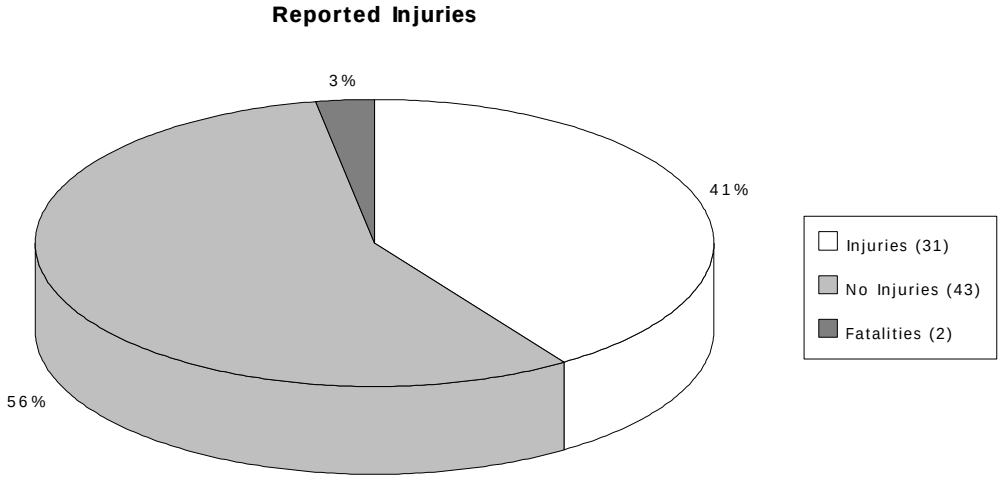

Fig 5

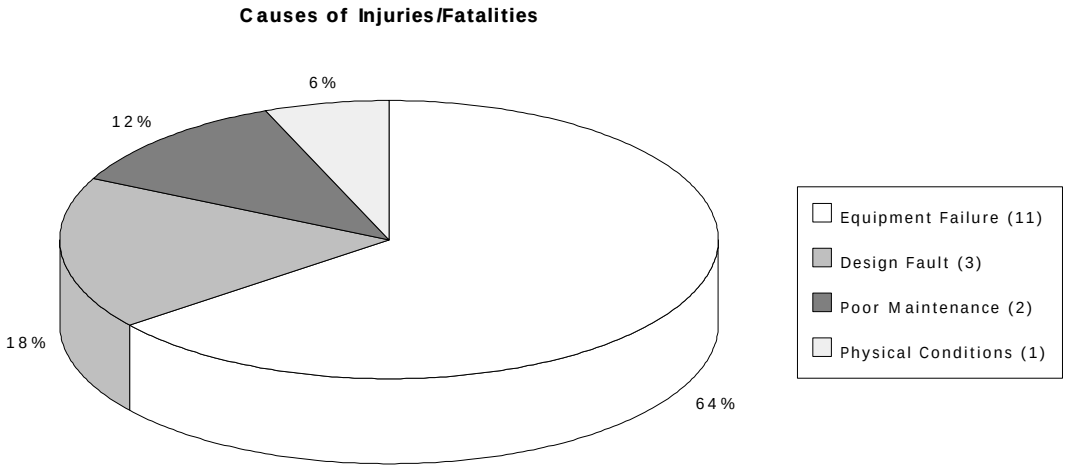

Fig 6.

5. BRAKE AND HOOK RELEASE SYSTEM SHORTCOMINGS

About two thirds of reported brake and hook/release system failures were apparently due to a combination of design shortcomings and mechanical failure.

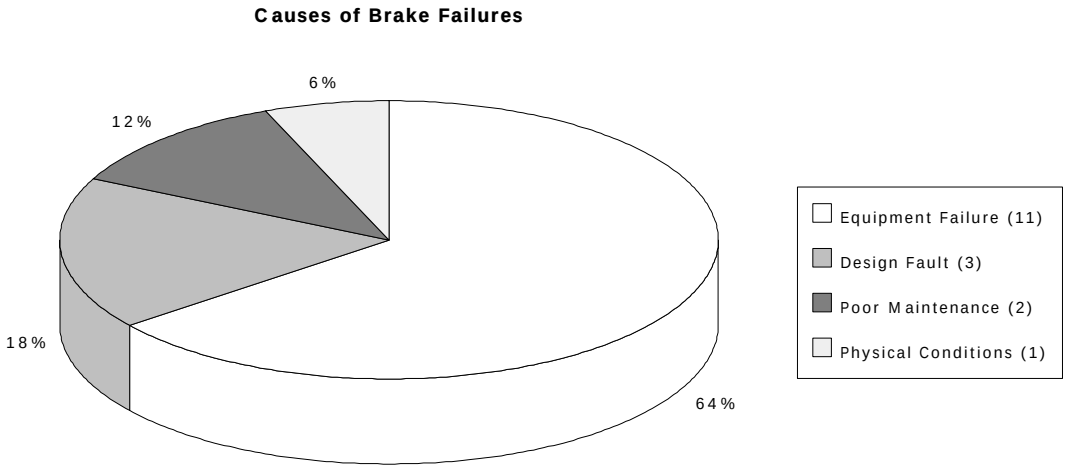

Fig 7.

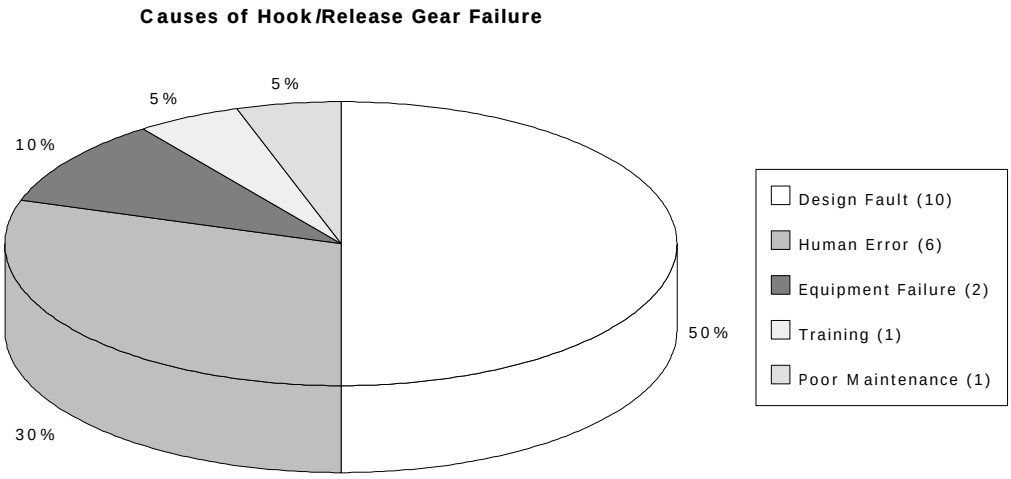

Fig 8.

6. LESSONS LEARNED

(a) The survey clearly demonstrates that most lifeboat incidents occur during training drills required by the SOLAS Convention, flag State or Company directives. As the purpose of this training should be to raise crew confidence and competence to handle a real emergency, the marine community should re-consider if this objective is being fulfilled.

(b) The design and construction of lifeboats and in particular auxiliary equipment, such as brakes and release gear, play a significant part in contributing towards the cause of many lifeboat incidents with the most catastrophic event being the opening of a boat hook with the boat some distance from the water. Incidents of this nature can be avoided if the boat crew is able to confirm the hook is secure for lowering or lifting. Lifeboat brakes, although implicated in many of the reported incidents, fortunately did not cause any fatalities. Their repeated failure has, however, played a large role in reducing ship staff confidence in lifeboats.

(c) The survey did not attempt to highlight any particular type of boat or release gear in need of improvement or modification, however, there is evidence that some boats are not sympathetically designed for the seafarer. As an example, the canopy of a totally enclosed lifeboat may limit the coxswain's ability to supervise the securing of hooks for lifting. This canopy, coupled with fore and aft hatches that are not designed with due consideration for the need to observe and avoid swinging blocks during the recovery operation, puts the boat crew in jeopardy when trying to come alongside and hook up in a seaway.

(d) Human error also proved to be a significant contributory factor in many of the reported lifeboat incidents, as it is in most accidents. Lack of supervision was not found to be a significant factor in the cause of reported human error related incidents, hence, it is of concern that the potential for mistakes might reasonably be expected to increase during the stress of a real emergency situation.

(e) SOLAS requirements for lifeboats, with the exception of minimal requirements for rescue boats, are focused on launching. Although regular training is required, insufficient emphasis is placed on measures designed to ensure that routine operations, such as recovery and lifting of lifeboats and rescue boats, can be conducted safely.

(f) Seafarers lack confidence in the current generation of lifeboats, to the extent that there is sometimes an unwillingness to conduct the necessary drills. Responsibility for much of this cynicism rests in the lack of human factors considered in lifeboat design and legislation. This is reflected in the design, and construction of some boats where the focus is cost competitiveness rather than providing equipment that is easily maintained and simple to understood and operate.

7. RECOMMENDATIONS

The maritime community should effect changes to and improve standards for existing and new lifeboats in order to reduce the number of incidents to a minimum.

Ship Operators/Owners should:

(a) Review their lifeboat training programs to ensure all members of ship staffs understand lifeboat launching and recovery procedures on ships on which they are expected to serve.

(b) Review lifeboat maintenance practices to confirm regular inspection of all critical components such as:

- Brakes - inspect for wear and contamination with lubricant. Confirm the ability to raise a loaded boat without the need to pin the brake closed.
- Hooks and Release Mechanisms - inspect to see that components are within tolerance and adjusted properly. Ensure that any manufacturers recommended modifications have been properly carried out.
- Boat Lowering Control Wires - inspect to confirm they do not make contact with the boat canopy during lowering thereby making them ineffective.
- Falls - inspect regularly to ensure they are sound and, at appropriate intervals, they are turned end for end or renewed.

(c) Consider installing a manually operated wire spanning the hooks to prevent the boat from falling if the hook releases inadvertently. This wire should be used only during drills and be capable of being released under load.

(d) Confirm that the lifeboats can be safety lifted from the water to the disembarkation position with a full complement.

Boat Designers, Builders and Installers should:

(a) Review boat designs to improve user friendliness by:

- Simplifying operating mechanisms so that maintenance is more straightforward and can be reasonably achieved using the facilities normally found onboard. A prime consideration should be the infrequent use of this equipment and the level of on board maintenance personnel expertise.

- Increasing the safety range of tolerances and adjustments of critical components, particularly those associated with release gear.

- Providing positive primary indication from the coxswains position that the hooks are properly set for lifting. Secondary indicators such as lights, cocking handle position, and release handle position should not be considered adequate.

- Sizing the hatches at the ends of boats so that they do not hinder the safety of crew members responsible for connecting the hooks.

- Reducing the complexity of brakes and providing “tell tale” devices to alert the ships staff of contamination by oil, water, etc.

- Providing external indication of brake condition and remaining life.

- Installing boats so they are easily and quickly accessible for boarding and disembarkation.

- Providing the capability to lift boats from the water to the disembarkation position with a normal drill complement on board.

Flag States, IMO and Classification Societies should:

(a) Review current regulations to ensure they contain adequate requirements for the safe lifting of boats during drills and the rapid and effective disembarkation of an injured person from designated rescue boats.
(b) Review competency, training and certification requirements to ensure they adequately address the skills needed to maintain modern lifeboat systems in their entirety.

(c) Review periodic maintenance requirements, and periodic and continuous survey requirements to confirm they are adequate to assure the integrity of lifeboat systems.

The above suggestions should be adopted on existing lifeboats to the maximum extent practical to restore ship staff confidence in their primary evacuation equipment.

ANNEX

REPORTED LIFEBOAT INCIDENTS

Ship	SHIP TYPE	Date	Description of Incident	Countermeasures
1.	T	1990	Release gear hook opened.	Training strops adopted.
2.		1993	Maintenance personnel inadvertently released a stowed boat - 1 person killed.	
3.		1992	Release gear maladjusted so that clevis pins failed causing collapse of connecting Rod.	
4.		1992	During washing of superstructure, water penetrated a junction box causing a short circuit, whereby the davit motor started heaving. The safety stop system also failed due to a short circuit.	Connection boxes moved to inside superstructure. Power switched off at main switchboard.
5.	F	1992	Failure of lifting gear pin.	
6.			Incorrect size rings used in release gear.	See M Notice M.1492.
7.		1992	Whilst preparing boat for launching during a fire, the forward hook detached.	
8.	F	1992	Release mechanism not properly set for launching, as a consequence the aft hook released.	
9.	T	1992	Boat lowered uncontrollably due to grease In disc brake.	Routine maintenance procedures under review.
10.	T	1992	Boat hoisted with brake lever pin in place. Boat jammed and when the pin was released the boat jarred causing an occupant to fall.	Control wire modifications in process. Brake pin procedures under review.
11.	T	1992	Grease on brake.	Hand greasing only.
12.	T	1992	Hanging off strop broke during lowering to embarkation deck.	Strop found to be badly corroded. Corrosion not visible. Similar situation found on other parts of strop.
13.	T	1986	Grease on brake.	Brake maintenance procedures improved.

F = FREIGHT P = PASSENGER T = TANKER

REPORTED LIFEBOAT INCIDENTS

Ship	SHIP TYPE	Date	Description of Incident	Countermeasures
14.	T	1992	Control wire jammed.	Control wire redesigned and weight added to brake control lever.
15.			Davit collapsed during testing of novel tricing/browsing gear.	
16.	T	1992	Failure of fall wire. - Human error.	Manoeuvring handles marked properly. Fall wires to be longer so that more turns remain on drum when the boat is lowered to water.
17.	T	1990	Winch brake had difficulty in holding the boat.	Brake shaft roller bearing should be examined every time winch is surveyed.
18.	P	1992	During recovery the lifeboat drifted forward resulting in the forward fall block disconnecting.	
19.	P	1991	Lifeboat hoisted to the embarkation deck where it spontaneously lowered.	Roller Clutch opened and assembly changed. Management decided to replace clutch mechanism in all lifeboat winches with a more robust type.
20.		1992	Equipment failure - hook. Forward hook jammed.	Release wires and hook freed.
21.			Equipment failure - hook. Poor design. Lifeboat self released while vessel was navigating in stormy weather.	Replacement boat secured and not used until modifications to new system approved.
22.		1993	Davit failure. Design fault. Both port and Starboard lifeboats failed to lower when brake lifted.	
23.		1992	Human error and lack of proper training. The lowering brake was lifted. The keel struck the davit arm. The skeg caught inside the fish plate.	Label davit slew control lever. Regular instruction to crew on launching procedure.
24.		1992	Design fault. Failure of boat activated brake release mechanism. Brake was unable to be disengaged sufficiently to allow the boat to swing outboard.	Modified lead of release wire.

F = FREIGHT P = PASSENGER T = TANKER

REPORTED LIFEBOAT INCIDENTS

Ship	SHIP TYPE	Date	Description of Incident	Countermeasures
25.		1993	Equipment failure - hook. Hooks failed to release using internal release mechanism.	Aft tripping hook modified. Release gear stripped and overhauled.
26.	T	1992	Equipment failure - fall wire. Fall on the port lifeboat davit parted during the recovery of the boat. The forward fall jumped the sheave above the winch drum apparently jamming and causing the wire to part.	New falls were fitted.
27.		1992	Hook failure due to human error, lack of training and design fault. Locking mechanism failed to engage properly. Safety pin did not fit boat. Boat fell from stowed position.	Develop and post procedures. Develop regular maintenance schedule. Replace locking pins. Replace catch levers with stainless steel equivalents. Re-position davit winch.
28.	T	1992	Equipment failure of boat activated break release and gripe due to design fault. Difficulties in launching due to brake mechanism.	Modified release mechanism.
29.		1991	Human error and poor communications caused injury to personnel. AB was using handle to engage gears while another person started the electric hoisting motor. The handle flew off cracking his cheek bone.	Mechanical and electric devices have been fitted.
30.		1992	Housing the starboard lifeboat the forward fall parted.	
31.		1992	Release gear failure due to poor maintenance. Hooks failed to release when lever operated from within the boat.	Check and maintain release gear on regular basis.
32.	P	1991	Lifeboat being eased off from side when the lifting hooks of the boat disengaged. The boat fell into the water.	
33.		1993	Equipment failure. Free fall to water during lowering exercise.	Overhaul and renewal of hydraulic components in circuit.

F = FREIGHT P = PASSENGER T = TANKER

REPORTED LIFEBOAT INCIDENTS

Ship	SHIP TYPE	Date	Description of Incident	Countermeasures
34.	P	1990	Equipment failure and poor design resulted in injury. Whilst lowering the boat a bottle screw broke.	
35.		1989	Lifeboat winch brake failed. Four roller clutch springs found broken.	
36.		1990	Lifeboat winch brake failed. Roller clutch springs found weakened and replaced.	
37.		1989	Roller clutch assembly failed to engage during recovery.	
38.		1992	Lack of training. During hoisting of lifeboat the ship rolled and the boat hit the ship side.	
39.		1991	Brake and hook failure due to poor design and human error. During hoisting, boat fell to water.	Replaced brake shoes and brake lever fitted with a stopper.
40.		1992	Equipment failure. Some internal stiffeners were missing which resulted in overload of the aft transom and aft deck supporting the release mechanism. Free Fall Lifeboat.	Repaired lifeboat.
41.		1992	Launching jib failure	
42.	F	1991	Hook failure due to poor design. During recovery the forward hook accidentally released. The stern and the aftermost hook broke off and the boat fell into water.	Design of release hook improved.
43.		1992	Hook failure due to lack of training. While bringing up the boat, the aft hook slipped off.	Safety meeting.
44.		1998	Hook failure due to human error. The on-load hook release mechanism operated on aft hook while boat was triced alongside embarkation deck.	Modified release system.
45.		1992	Brake failure. While lowering boat the brake did not function.	

F = FREIGHT P = PASSENGER T = TANKER

REPORTED LIFEBOAT INCIDENTS

Ship	SHIP TYPE	Date	Description of Incident	Countermeasures
46.		1991	Aft end hook fractured.	
47.		1992	Failure of boat activated brake release mechanism due to lack of maintenance. The remote release wire entangled the brake handle and caused a full launching.	Proper maintenance.
48.		1991	Lube oil from gearbox in release gear ran into the brake house. During drill unable to stop lowering lifeboat.	Gearbox in release gear for both lifeboats has been equipped with vent hole in order to equalize pressure.
49.		1992	Hook failure due to human error.	
50.		1991	Hook failure due to human error.	Release gear replaced with onload hooks with hydrostatic release.
51.		1991	Hook failure. Boat was swung out for maintenance of davits and greasing of falls. Boat was being stowed when the forward lifting hook pulled out of the bow.	Fleet wide survey.
52.		1991	Davit failure. Boat was being stowed when the davit track gave way.	New Davits constructed.
53.		1991	Davit failure. Lifeboat being hoisted back to stowed position when fall parted.	Closer monitoring of wire fall.
54.	P	1992	During hoisting operations, the lifeboat suddenly dropped.	Drums and shafts inspected and scheduled to be renewed.
55.	Tug	1992	Winch brake failed.	Cleaned brake drum and brake lining.
56.	F	1992	The electric motor was used to recover lifeboat. On stopping the motor, the lifeboat started to lower.	New bearing was fitted. Replaced centrifugal brake carrier and deadman brake segment.
57.	P/F	1990	Lifeboat was connected to davit falls and raised to a position in which the tricing pennants could be connected. Tricing pennant parted causing the lifeboat to swing.	Regularly check tricing pennant. Instructions issued.

F = FREIGHT P = PASSENGER T = TANKER

REPORTED LIFEBOAT INCIDENTS

Ship	SHIP TYPE	Date	Description of Incident	Countermeasures
58.	Standby Safety Vessel	1991	Crane fall parted while stowing lifeboat.	Wire fall fitted and to be inspected regularly. Revision in the upper limits of normal operation.
59.	P	1991	A senhouse slip and bottlescrew used to secure the boat when stowed fouled the forward fall. The fall became jammed in the forward sheave and continued to pay out until brake was applied.	Procedures altered such that senhouse slip and bottlescrew is stowed before lowering commences.
60.		1987	By-passed safety devices to permit use of davit winch motor during renewal of fall wires. Winch handle rotated and caused injury.	
61.		1987	Roller clutch of a davit winch failed.	
62.		1985	During recovery of the lifeboat, a loose turn developed and slipped across guide grooves of davit. The fall wire was forced between the end of the drum and winch body.	
63.	T	1985	Incorrect engagement of a lifting hook with fall block.	
64.		1985	Hook was unintentionally disengaged when boat was in its stowed position.	
65.		1992	On engaging the winch motor, the lifeboat failed to hoist.	
66.		1985	While recovering lifeboat to stowed position, the forward hook released which caused both davit arms to be pulled out of their trackways.	
67.	P	1984	A wire hanging-off pendant became caught under the counterweight of a hook causing it to open.	

F = FREIGHT P = PASSENGER T = TANKER

REPORTED LIFEBOAT INCIDENTS

Ship	SHIP TYPE	Date	Description of Incident	Countermeasures
68.		1984	Crew member trapped hand while attempting to attach the forward recovery pendant of a lifeboat prior to it being hoisted from sea.	
69.		1984	Aft fall block failure.	
70.	T	1984	The remote brake cable leading from inside the lifeboat parted.	
71.		1984	The winch brake suddenly released.	
72.		1985	Winch brake failed to hold.	
73.		1984	Winch brake failed during drill.	
74.		1985	Tricing pendant had been incorrectly secured which prevented further lowering of the after end of the lifeboat. Also a slack turn on winch drum caused the fall wire to jam between the drum and the drum end wire retaining flange.	
75.		1985	Forward gripe became caught between lifeboat and the davit arm chock.	
76.		1985	Crew member strained himself while lifting a fall block prior to the recovery of lifeboat.	
77.			While connecting a fall block prior to recovery, the hand of a crew member became caught between the lifting block and the launch handrail.	
78.		1985	Crew member leg trapped between davit framework and davit arm while trying to clear tricing pendant during hoisting operation.	

F = FREIGHT P = PASSENGER T = TANKER

REPORTED LIFEBOAT INCIDENTS

Ship	SHIP TYPE	Date	Description of Incident	Countermeasures
79.		1982	The portable air-driven motor suddenly stopped and the davit winch brake subsequently failed to prevent the lifeboat lowering.	
80.		1980	Check plate suffered a fracture 1/4" above weld securing it to the driving boss.	
81.		1991	Fillet weld securing the cheek plate to drive bossing failed.	
82.		1991	When the winch motor was stopped the lifeboat immediately started to lower. The after tricing pendant parted.	
83.		1990	Lifeboat became detached from the forward fall resulting in both davit arms being pulled out of their trackways.	
84.		1992	Trip hook for the aft self-releasing gripe fouled the davit structure preventing the aft davit arm extending fully to the outreach position. The boat lowered on the fall wires. The wire became snagged in its pulley sheaves which prevented the winch brake from returning to the stop position.	
85.		1991	The after fall disconnected causing the lifeboat to be suspended only by the forward hook.	
86.		1989	On passage a stowed lifeboat fell into the sea.	
87.		1991	When hoisting motor was disengaged. Boat ran back to embarkation position.	Assembly stripped down, deformed leaf springs in roller clutch mechanism and fracture of roller clutch outer race found.
88.		1991	When hoisting motor was disengaged. The boat ran back to the water.	Brake/clutch assembly was stripped down, grease found Clutch rollers. Assembly cleaned and re-built.
89.		1993	Freefall lifeboat self launched in heavy weather.	

F = FREIGHT P = PASSENGER T = TANKER

Oil Companies International Marine Forum

OIL COMPANIES INTERNATIONAL MARINE FORUM
27 QUEEN ANNE'S GATE
LONDON SW1H 9BU
ENGLAND
TELEPHONE: 0171-654 1200
FAX: 0171-654 1205
REGISTERED OFFICE:
CLARENDON HOUSE
CHURCH STREET
HAMILTON 5-33
BERMUDA