Management of Survival Craft on Fixed/Floating Offshore Installations

– Preliminary Findings on Best Practice

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Oil Companies International Marine Forum
29 Queen Anne's Gate
London SW1H 9BU
United Kingdom
Telephone: +44 (0)20 7654 1200
Email: enquiries@ocimf.org

www.ocimf.org

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The Oil Companies International Marine Forum (OCIMF)
Founded in 1970, 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, oil products, petrochemicals and gas, and includes companies engaged in offshore marine operations supporting oil and gas exploration, development and production.

Our vision is a global marine industry that causes no harm to people or the environment.

Our mission is to lead the global marine industry in the promotion of safe and environmentally responsible transportation of crude oil, oil products, petrochemicals and gas, and to drive the same values in the management of related offshore marine operations. We do this by developing best practices in the design, construction and safe operation of tankers, barges and offshore vessels and their interfaces with terminals and considering human factors in everything we do.

Contents

Glossary

Abandon vessel 'Abandon vessel' drills and musters are a regulatory requirement for merchant vessels and oil and gas regulators; they help determine escape preparedness in case the vessel has to be evacuated in an emergency.

Air (system) The system used to maintain positive air pressure inside the survival craft after it is deployed.

Coastal State For the purpose of this document, Coastal State is the state exercising jurisdictional and regulatory rights over its territorial sea (and Exclusive Economic Zone (EEZ)), which includes regulating offshore installations and operations.

Communications (system) The system survival craft personnel use to communicate with the facility, the central control room, other craft, and/or emergency services.

Coxswain The person at the helm who steers a survival craft and who has charge of the craft and its crew.

Davit Device used to lower a survival craft into the water from its stowed position, or to raise a survival craft from the water into its stowed position. The davit can have one or more arms to swing a boat outboard (ship type davit) or be of a cantilever design (rig davit).

Deluge (system) A system that ensures a water envelope surrounds the survival craft's superstructure.

Deployment (system) The system used to get a survival craft into the water (e.g. hydraulic system for free-fall survival craft or davit system for gravity-launched survival craft).

Dual-fall survival craft A survival craft that has two hooks and is launched by a davit using two wire falls.

Exclusive Economic Zone (EEZ) The United Nations Convention on the Law of the Sea (UNCLOS) defines an EEZ as generally extending 200 nautical miles from shore, within which the Coastal State has the right to explore and exploit, and the responsibility to conserve and manage, both living and non-living resources.

Facility/offshore facility A general term for mobile and fixed structures, which are intended for exploration, drilling, production, processing or storage of hydrocarbons or other related activities or fluids. The term includes installations intended for accommodation of personnel engaged in these activities. Offshore installation covers subsea installations and pipelines.

Fall Preventer Device A Fall Preventer Device (FPD) can be used to minimise the risk of injury or death by providing a secondary alternate load path in the event of failure of the on-load hook or its release mechanism or of accidental release of the on-load hook.

Fixed platform Jacket or gravity based platforms.

Life Saving Appliance (LSA) This term includes lifeboats, lifejackets, liferafts and many other appliances, designed to be used by crew in the case of emergency to protect their lives at sea. Such equipment differs depending on many factors, including unit/vessel size, activity and voyage or location.

Maintenance pendant (or pennant) Specifically designed rigging for hanging off the survival craft to free the release gear for maintenance.

Survival craft A craft capable of sustaining the lives of people in distress from the time of abandoning the ship. Often referred to as 'lifeboats' or 'liferafts'.

Abbreviations

ALARP	As Low As Reasonably Practicable
Circ	Circular
DNV	Det Norske Veritas
FLNG	Floating Liquefied Natural Gas (facility)
FPD	Fall Preventer Device
FPSO	Floating Production Storage and Offloading (facility)
FPU	Floating Production Unit
FRC	Fast Rescue Craft (Note: in IMO publications referred to as Fast Rescue Boat (FRB))
FSO	Floating Storage and Offtake (facility)
IMO	International Maritime Organization
LSA	Life Saving Appliance
LSA Code	Life Saving Appliance Code
MODU	Mobile Offshore Drilling Unit
MSC	Maritime Safety Committee
OCIMF	Oil Companies International Marine Forum
OEM	Original Equipment Manufacturer
SOLAS	International Convention for the Safety of Life at Sea
STCW	The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers

Bibliography

Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU Code, 2009) (IMO)

International Convention for the Safety of Life at Sea (SOLAS) 1974 (IMO). Available from https://www.imo.org-(SOLAS)-1974

International Life-saving Appliance Code (LSA Code) (IMO)

Resolution A.891(21) Recommendations on Training of Personnel on Mobile Offshore Units (MOU) (IMO)

Resolution MSC.1/Circ.1486 Guidelines on Alternative Methods for Survival Craft drills on MODUs (Maritime Safety Committee, IMO)

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Safer Together, working with stakeholders in the Asia Pacific region, developed regional guidance for the offshore industry. This work was the starting point for this document and the contribution from the Safer Together team cannot be overstated. OCIMF also acknowledges InterManager's work on this issue and in particular the sharing of incident data, as reflected in the appendix.

IOGP endorsement of findings

Survival craft are a key safety critical component on fixed and floating offshore installations. IOGP fully endorses this paper and the case to improve best practices and reduce the operational risks of operating and managing the survival craft.

1 Introduction

This information paper aims to drive improvements to current Life Saving Appliance (LSA) design and safeguards, regulatory requirements, industry best practices and programmes. It makes a case for change to the IMO, government marine regulatory authorities, industry partners and LSA Original Equipment Manufacturers (OEM). The change sought is an agreed international standard that is fit for purpose for the design, maintenance, training, testing and operation of offshore facility survival craft.

The risks presented at offshore facilities are greater than those onboard a merchant ship. A ship can relocate to perform tests and drills in a sheltered, benign location (e.g. dock, protected harbour) and position itself to protect the survival craft launching/recovering area from environmental effects such as wind, seas and current. By contrast, offshore facilities operate in a fixed position, exposed to open ocean environments significantly more challenging and presenting significantly higher risks. Launching and recovery of a survival craft presents numerous potential hazards with a higher risk of personnel injury and damage to safety critical equipment for offshore facility personnel, most of whom are non-mariners and therefore not trained as such.

In support of the above, this information paper advocates:

- Safe working practices for offshore industry personnel, vessel crews, training providers, manufacturers and other maritime industry participants when operating, testing and maintaining survival craft at offshore locations.
- Equipment and processes associated with these activities to be optimised to reduce personnel health and safety risk exposure and damage to craft, while still satisfying equipment functionality and crew competency needs.
- Adopting survival craft in-situ function testing instead of in-water testing.
- Enhanced training and competence assurance programmes for survival craft operations, inspection and maintenance.

There are some similarities between merchant ships and offshore facilities regarding the need to evacuate in an emergency. SOLAS rules and the related LSA Code have therefore been applied by Flag and Coastal States respectively to regulated offshore moored floating and fixed facilities' survival craft in the absence of any other available guidance.

However, SOLAS and the LSA Code were specifically intended for merchant ships; these rules are not typically fit for purpose for offshore facility survival craft.

The case for change is therefore clear. There is an urgent need for an industry-wide guide for operation, maintenance, testing and crew competency that reduces the risk of serious harm to people and physical damage to life saving assets. This can help to form the basis of future updates to Flag and Coastal State regulations that are fit for purpose.

Currently, all survival craft operators must maintain training and competency to safely operate survival craft during personnel mustering, embarkation, launching, piloting and recovery. All offshore personnel not directly involved with the survival craft's operation must also receive survival craft familiarisation training. However, testing equipment and verifying competency during launching/recovery of survival craft in offshore conditions poses risks (such as equipment unsuitability or hazards related to launch and recovery). For drill purposes, it is recommended that alternative means to manned launch and recovery should be applied, to eliminate risks in the offshore environment.

MSC.1/Circ. 1486 provides limited allowance for alternative means of equipment testing and crew competency assurance for Mobile Offshore Drilling Units (MODU):

> The launching, manoeuvring and retrieval of lifeboats in remote offshore locations and similar unfavourable environmental conditions creates hazardous situations and potentially the inability to carry out such testing safely.
>
> Accordingly, the 2009 MODU Code allows for the situation where the regular, and full, completion of lifeboat launch and manoeuvre may not be possible…

> Where alternative methods of testing lifeboats are employed, they should ensure achievement of a level of assurance of capability and readiness at least equivalent to that achieved through physical launching and manoeuvring.
>
> Such assurance includes the lifeboat equipment, the lifeboat crew and procedures and systems.

However, this is applicable to MODUs only and not other types of offshore facility.

This information paper is intended as a contribution to further work, culminating in a more detailed publication in parallel with a case for change submission to the IMO.

2 Scope

This information paper aims to reduce health and safety risks to as low as reasonably practicable (ALARP) for personnel undertaking survival craft testing, maintenance, and operations at offshore facilities.

Offshore facilities may include, but are not limited to:

- MODU.
- Floating production structures.
- Fixed-jacket and gravity based offshore production platforms (both manned and unmanned).

The types of survival craft, rescue boat and their associated equipment may include, but are not limited to:

- Single-fall survival craft.
- Dual-fall survival craft.
- Free-fall survival craft.
- Offshore cantilever davit.
- Ship type gravity davit.
- Heave compensated davits.
- Crane type davits.

3 Existing regulatory framework

Regulations vary significantly for offshore facilities, depending upon region. Some are very prescriptive while others are based in a Safety Case approach. Some merely duplicate SOLAS regulations, which mandate an in-water operational test every three months. SOLAS also forms the basis of OEM guidance, as their main market is merchant shipping.

The SOLAS requirements do not generally apply to MODUs and disconnectable self-propelled facilities, except when off-station, depending on Flag State and/or Coastal State requirements. In some offshore areas, the Coastal State may only apply SOLAS when these units are off-station; another relevant authority could apply additional rules when they are on-station.

A number of Coastal States currently acknowledge that environmental conditions do not always allow the safe launching and recovery of survival craft. Operators are expected to schedule the launching of survival craft for functionality testing and crew competency assurance with appropriate regard for environmental conditions and assessment of risk to personnel. Consequently, OCIMF strongly encourages operators to develop and implement alternative methods for conducting assurance activities that can be performed even in environmental conditions that limit launching and recovery opportunities.

Manufacturers, regulators and operators have defaulted to SOLAS and LSA Code because there is no agreed international standard for design, maintenance, testing and operation of offshore survival craft. This does not necessarily recognise the unique risks and challenges faced by offshore facilities.

Regulatory guidance does not consider having to safely recover the craft after in-water testing. The recovery phase generally poses the higher level of risk, especially for unprotected offshore facilities, as there are no means to stabilise the craft while reconnecting to the falls. This makes in-water testing and drills a high-risk activity, to both personnel and equipment. Incidents indicate that after wet testing, hooks are not always reset correctly. This leads to inadvertent opening of the hooks, overloading and shocking of the lifting system and subsequent failure of lifting components, resulting in craft falling to the sea. Such incidents have frequently led to fatal injuries.

There is also a lack of internationally agreed standards for the training and certification of offshore survival craft operators, specifically focussed on offshore installations. Most training takes place at centres with a SOLAS and LSA focus for merchant shipping, and the applied regulations vary globally.

SOLAS and MODU Code, as applied by Flag State to registered floating facilities, requires rescue craft or fast rescue craft. Again, this rule was intended for merchant vessels and MODU and may not be applicable to a permanently moored floating facility, which uses field vessels equipped and available to respond in the event of a person in the water or facility evacuation event.

Permanently moored and bottom founded offshore platforms are not vessels and are not governed by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). However, for disconnectable facilities (when off-station), STCW and applicable Flag State certification is relevant.

Current SOLAS, Coastal State and Classification Society regulatory guidance is listed in section 6, along with other reports and resources related to survival craft maintenance and operations on offshore facilities. These include material from UK Health and Safety Executive (UK HSE), Safer Together in Australia and the National Offshore Safety Advisory Committee in the US.

4 Functionality testing and maintenance

All survival craft should be in a continuous state of readiness. Operational verification ensures that, in an emergency, a survival craft can be launched successfully and manoeuvred away from the facility for abandonment or recovery. Crucial to achieving this are the integrity of the survival craft's hull and the successful operation of various systems, including deployment, propulsion, deluge, steering, air, launch and recovery, and communications systems.

Specific verification activities, as per OEM requirements, should be developed for different survival craft types, makes, and models, and these should be incorporated into the facility operator's maintenance verification checklists. Each OEM has checklists for the survival craft they manufacture, which may include maintenance, function testing, verification activities, work instructions, and task frequency schedules.

Survival craft on offshore facilities are exposed to the weather and sea conditions at their locations. Facility operators will need to develop a survival craft maintenance and testing strategy to suit those conditions such as an in-situ testing strategy.

4.1 Hazard identification and control

Personnel need to enter survival craft to do maintenance, inspection and testing activities. Personnel may include:

- Technicians and third-party specialist survival craft contractors.
- Survival craft crew or other competent persons.
- Regulatory inspectors and class surveyors.

Personnel should never be in a survival craft for maintenance, inspection and testing purposes during launching and recovery.

When planning and performing maintenance activities or undertaking training routines, the following hazards should be assessed:

- Metocean conditions.
- Failure of on-load release mechanism.
- Inadvertent operation of on-load release mechanism.
- Incorrect maintenance of survival craft, davits and launching equipment.
- Structural and equipment integrity failure.
- Communication failure.
- Lack of familiarity with survival craft, davits equipment and associated controls.
- Unsafe practices during survival craft drills and inspections.

The elimination of hazards is normally carried out in accordance with the figure below:

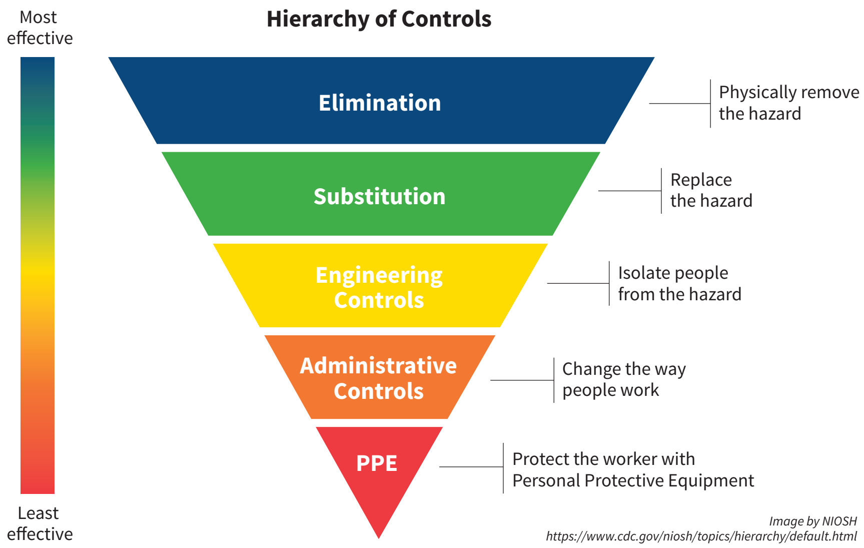

Figure 4.1: *Hierarchy of Controls*

Global incident data suggests that unacceptable numbers of personnel injuries and deaths are occurring when operating, testing and maintaining survival craft.

Figure 4.2 shows total injuries and deaths during lifeboat incidents since 1980. See appendix for source data.

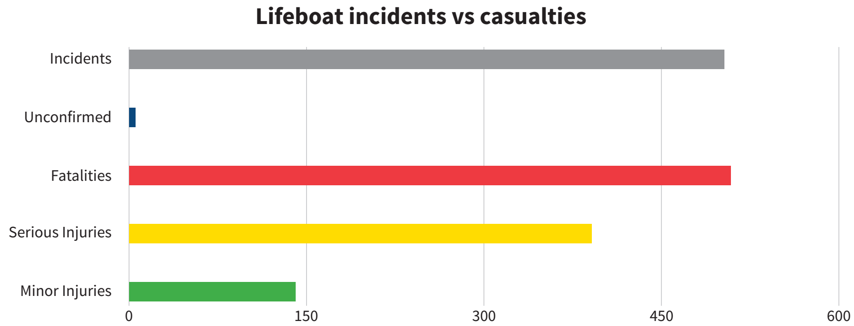

Figure 4.2: *Lifeboat incidents vs casualties, 1980-2023*
Incident statistics shared by InterManager

The main risk to personnel is falling from height while in a survival craft during launching and recovery activities. The launch height from an offshore facility is typically several times greater than from a standard merchant ship, which increases the risk of serious injury, fatality and/or total loss of equipment.

4.2 Human factors

Failures in planning and execution can result in not achieving the desired outcome of a planned action. The potential for human errors in carrying out a planned action should be evaluated when assessing safety critical steps within the maintenance, inspection and testing routines. Potential for human errors when carrying out such activities should be identified, the adequacy of control measures confirmed and, where necessary, additional controls put in place to prevent or mitigate the risks.

Factors to consider include:

- Training: is appropriate training in place to familiarise staff with the life saving appliances?
- Competency and training: are key personnel (coxswains) deemed competent to operate the life saving appliances under stressful conditions?
- Communication: are staff aware of the communications tools available and do they understand the communication requirements?
- Fatigue: are staffing levels sufficient to take into account the testing and maintenance requirements of the life saving appliances?
- Initial design of equipment and human-machine interfaces: has consideration been given to the initial design of equipment and in particular the human-machine interface?
- Inadequate procedures: have procedures been reviewed from a human factors perspective?
- High stress operation: have stress factors been taken into consideration?

Refer to OCIMF's information paper *Human Factors: Management and Self Assessment* with a view to survival craft maintenance and testing. Organisations should also look at their own human factors guidance together with general industry guidance and apply measures appropriately.

4.3 Adopting best practice

Offshore facilities, dependent on their type and design, may need to comply with both oil and gas regulations and maritime regulations. Oil and gas regulations typically adopt a risk-based approach, whereas maritime regulations tend to be definitive and prescriptive by design. Currently, many OEMs recommend testing and preventive maintenance tasks and schedules for their survival craft in accordance with SOLAS guidance for merchant vessels. These are not fit for adoption at an offshore facility, due to its design and exposure to an open ocean environment.

For offshore facilities, in-situ inspection and maintenance is considered to reduce risk to ALARP for providing survival craft functionality assurance. It avoids the personnel and equipment risks associated with launching and recovering survival craft in an exposed, offshore environment.

OEM participation in maintenance activities is defined in operations and maintenance manuals, and local OEM offices can support significant maintenance activities for the survival craft they manufacture.

Industry data has shown that there are gaps in identifying failure modes. Facility operators should work with their survival craft OEM to define in-situ maintenance, inspection and testing activities for their offshore environment.

The overall responsibility of the survival craft and davit maintenance is the responsibility of the facility that owns or is managing the equipment. Inspecting and testing of all systems should be done in discussion with the OEM.

There are two groups who can do the maintenance, each with dedicated roles:

- Facility crew members – responsible for weekly, monthly inspection and routine maintenance.
- OEM Certified Persons or Authorised Service Providers – capable of all maintenance.

The facility operator should have a documented process in place to validate that all OEM Certified Persons or Authorised Service Providers and mobilised technicians are suitably competent. Facility crew members responsible for regular inspection and routine maintenance on board should have access to OEM maintenance and inspection documentation, receive appropriate OEM training, and be able to demonstrate competence.

Except in cases of actual abandonment, personnel should only board survival craft in the stowed position with the required OEM approved maintenance pendants fitted. All pendants should be specifically designed and fully rated for use with the installed survival craft, and they should be included in the planned maintenance regime for the facility.

Operators of offshore facilities are advised to review the expected service life of the provisioned life saving appliances. Technology develops, and while there may be valid reasons to upgrade and retrofit new designs, it may sometimes be better to replace the asset.

4.4 In-situ testing and verification

Some OEMs have developed methods of testing the craft's critical onboard systems. These can include:

- Deluge system: Tests the deluge system using water from a water tank, or similar, on the facility.
- Engine dynamometer, including a heat exchanger, and/or engine cooling: Allows the engine to operate for more than five minutes. An external water source is needed for both the heat exchanger and cooling system.
- Release hooks (on- and off-load): A mechanical or hydraulic system installed to the release hooks allows on- and off-load functions to be tested while the survival craft is hanging in the maintenance area.
- Simulated free-fall: A mechanical or hydraulic system installed to the release system of a free-fall survival craft, which allows for simulated free-fall in the davit without having to launch the craft.

The use of these alternative testing methods eliminates the risk of harm to personnel and damage to equipment that may occur during in-water testing, without comprising equipment readiness.

4.5 Survival craft sparing and rotational options

Offshore facility operators may have spare survival craft. While one craft is ashore undergoing OEM maintenance and in-water testing, the spare is used as a replacement on the offshore facility. By keeping a full complement of survival craft at the facility, the number of people on board can remain steady and all personnel can still be safely evacuated in an emergency.

Some OEMs also provide 'like-for-like' survival craft models for rotation, as well as equipment for onshore transfer of survival craft and complete rescue craft davits. These may be available to operators who do not have their own spare survival craft.

It is recommended that future offshore facility design provides for the ability to move survival craft via the facility crane from the launch cradle/davit to a laydown area without launching to water. This allows survival craft to be changed out without exposing personnel and equipment to the risks associated with operations in exposed, open ocean environments.

Depending on existing facility design, operators may consider alternative methods. This may include the use of supply vessels with fixed or motion compensated cradles to land the craft for transport ashore or to a protected nearshore testing area.

Where possible, survival craft landed ashore for maintenance should be used for training and familiarisation. Onshore testing and using rotational survival craft is recommended so that equipment can be safely tested in sheltered waters, or ideally at a dedicated test pond/pool. Equipment rotation also allows for enhanced testing and maintenance to be conducted safely and could align with other maintenance activities, such as five-yearly load testing.

An example of a risk-based approach to assurance testing would be to use in-davit testing of all survival craft offshore each year, with 20% of survival craft sent onshore for enhanced testing each year, on a rotational basis.

4.6 Future design considerations

As SOLAS is not applicable to offshore installations unless required by Class, Flag or local regulations, it is recommended that additional specifications are considered during design and fabrication of a SOLAS type approved lifeboat to meet the specific needs of offshore installations. These might include the following:

- Water, food, fuel and equipment should be relevant to the location of the installation.
  - Response to an offshore incident is much quicker than for a merchant vessel due to typical geographical location.
- Dyno for engine performance testing. This could be portable units or dedicated units.
  - This could also reduce the engine test schedule and planned maintenance activities and enable engines to be run at high load to check all associated functions and alarms.
- Additional connections for in-situ testing.
  - Engine cooling water.
  - Sprinkler system.
  - Stern tube seal/propellor seals lubrication/cooling.
- System for cooling air bottles as they are charged, including external connections for compressors.
- Lifeboats should be designed to meet the capacity and dimensional requirements of the people they are expected to accommodate:
  - Seat size and spacing for the total complement, also taking into consideration the type of lifesaving equipment required to be worn by each occupant.
  - Seat size and spacing for larger people.
  - Seat belts should be four-point harness with head restraint.
  - Height adjustable seat belts (adjustable shoulder height).
  - Lifeboat seats are recommended to have structural capacity of 150kg without damage or deformation.
  - Lifeboat seat belt securing brackets are recommended to be sufficient to secure a 150kg person.
  - Fixtures should be bolted, avoiding screws that are mounted in line with the direction of pull.
  - Hip belt should be close to the transition from the seat base to seat back.
  - Adequate protection in the seating areas to reduce impact injuries.
  - Lifeboat instructions to include bracing arms when lowering.
- Twin Fall Hooks. Consider having each hook be capable of supporting the full lifeboat weight and the associated dynamic forces should a single hook open or fail.
- Simplification of release gear design (i.e. load over centre) to minimise failure modes and reduce complexity, e.g. elimination of hydrostatic interlock.
- Lifeboat Release and Retrieval Systems, consider alternative to cables.
- Electric lifeboats offer significant maintenance savings and should be considered.
- Remote monitoring and diagnostics for lifeboats.
- Improved fuels or additives for lifeboat engines. Hydrotreated Vegetable Oil (HVO) or fuel additives to increase the cetane number and improve combustion (cleaner ignition) and reduce silting up of engines at low load.
- Replace steel/aluminium compressed air bottles with composite bottles – these are lighter and can have a longer service life.

- Freefall lifeboats – do not install Davit A-frame if boats are not going to be launched for testing purposes and lifeboats are within reach of a facility crane of a suitable rating.
- Reductions in lifeboat maintenance should be based on the specific operational environment and not be constrained by SOLAS fixed schedules.
- Self-lowering mechanism (centrifugal brake) to eliminate the remote-control brake cable.
- Provide ability to change fixtures and suspension bolts while lifeboats are in the davits.
- Provide securing points for rope access or access platforms on the davit for conducting maintenance.
- Consideration should be given to specifically designing a rescue boat (where required) for the expected risks.
- Provide dedicated fixture points and stowage locations for stretchers.

5 Personnel training and competence

There is a lack of internationally agreed standards for training and certification of offshore survival craft operators and the applied regulations vary globally.

Historically, launch and recovery of survival craft provided the only opportunity for coxswains and those with specific launching tasks (as per the Muster List) to undertake site-specific training.

Survival craft familiarisation for all people on board the facility is typically included in internationally recognised, basic safety training that includes water survival activities. It is recommended that all personnel participate in familiarisation activities in onshore training facilities as well as site-specific briefings offshore.

Facility operators who support an in-situ testing method also need to ensure that personnel are knowledgeable and competent in the use of survival craft in a launching scenario.

5.1 Competence assurance

For competency assurance programs to be effective, they should go beyond the ‘how to’ approach. It is important that the reasoning behind these critical procedures is explained, understood and validated. Knowing why critical operations are performed in a particular way helps the operator to understand the critical procedures and to remember them when under stress. Many operational manuals do not extend this far, but like-for-like training on onshore facilities and simulator-based training will help to train facility personnel.

It is recommended that offshore survival craft coxswain training be refreshed every two years, to maintain a valid certificate of training. While there is no single, globally agreed offshore survival craft training course for coxswains, a valid training certificate (initial or refresher) and ongoing workplace experience is required to be eligible for competence assessment or reassessment.

5.2 Documentation of drills and training

Offshore facility operators should maintain complete records of all survival craft related training, including crew familiarisation, survival craft coxswain training, regular drills and emergency exercises. These should be maintained and accessible for internal and regulatory compliance purposes.

This documentation may also include procedures for emergency drills (including abandonment drills), procedures for occupant boarding and weight management guidance in the survival craft.

5.3 Enhanced means of training and competency assurance

Everyone on board an offshore facility should be familiar with entry into the facility's survival craft, seating and restraint systems within them, and launching procedures. This familiarisation is carried out as part of internationally recognised basic survival and water survival training courses and should also be included in offshore facility familiarisation.

Enhanced means of training for coxswain and operating crew can be achieved by various methods, including the following:

- Virtual reality.
- Shore-based simulator.
- Shore-based training.
- Onboard simulated training.
- Computer-based training.
- OEM-provided training aids.

These methods eliminate the risk of harm to personnel and damage to equipment during in-water testing without comprising equipment readiness. See sections 4.1 and 4.2 for details of these risks.

Accredited virtual coxswain refresher training, tailored to the type of survival craft and local operating environmental conditions, should be developed at progressive levels of complexity. This will allow coxswains to hone their skills in survival craft operations without actual survival craft launch and recovery operations.

When a virtual reality set is placed onboard, any coxswain arriving on the facility can be trained within 24 hours to be familiar with the equipment and procedures of the survival craft onboard. Simulated scenarios expose coxswains to a variety of training outcomes, which enable them to improve their specific boat skills in a controlled environment, including preparation, launching, releasing and boat handling skills. Scenario-based training in a simulator provides a means to practice and demonstrate launching and recovering tasks, which meet or exceed the training requirements for lifeboat and fast rescue boat drills.

6 List of reference material, codes and standards

IMO Maritime Safety Committee

International Safety Management (ISM) Code (as amended)

MSC.1/Circ.1205/Rev.1 Revised guidelines for developing operation and maintenance manuals for Survival Craft systems

MSC.1/Circ.1466 – Unified interpretation on fall preventer devices (MSC.1/CIRC.1392 and MSC.1/CIRC.1327)

MSC.1/Circ.1578 Guidelines on safety during abandon ship drills using Survival Crafts

MSC.1/Circ.1584 Amendments to the guidelines for evaluation and replacement of Survival Craft release and retrieval systems (MSC.1/Circ.1392)

MSC.1/Circ.1630 Revised standardized life-saving appliance evaluation and test report forms (survival craft)

MSC.1/Circ.1632 Revised standardized life-saving appliance evaluation and test report forms (launching and embarkation appliances)

MSC.320(89) Adoption of amendments to the international life-saving appliance (LSA) code

MSC/Circ.1093 – Guidelines for periodic servicing and maintenance of Survival Crafts, launching appliances and on-load release gear

Resolution MSC.1/Circ.1326 Clarification of SOLAS regulation III/19

Resolution MSC.1/Circ.1327 Guidelines for the fitting and use of fall preventer devices (FPDs)

Resolution MSC.1/Circ.1392 Guidelines for evaluation and replacement of Survival Craft release and retrieval systems

Resolution MSC.402(96) Requirements for maintenance, thorough examination, operational testing, overhaul and repair of Survival Crafts and rescue boats, launching appliances and release gear

Resolution MSC.459(101) Amendments to the international life-saving appliance code (LSA Code)

Resolution MSC.472(101) Amendments to the revised recommendation on testing of life-saving appliances (Resolution MSC.81(70), as amended)

Health and Safety Executive (UK)

Evacuation, Escape and Rescue webpage: https://www.hse.gov.uk/offshore/eer.htm

Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations (PFEER) 1995

Offshore Installations (Safety Case) Regulations 2005

RR599 Research Report: Overview of TEMPSC performance standards

Other resources

Guidance: MGN 560 (M) Amendment 2 – requirements for life-saving appliances (Maritime and Coastguard Agency)

Guideline: Assurance of TEMPSC and associated systems (N09000-GL1643 A467351) (NOPSEMA)

Lifeboats and Rescue Craft Safety on the Outer Continental Shelf (National Offshore Safety Advisory Committee US)

Managing Survival Craft Operations at Offshore Facilities Guideline (Safer Together Australia)

MARF034 Carry out fast rescue operations, Release 1 (Australian Government)

Marine Notice 2/2014 – AMSA inspectors entering Survival Crafts (AMSA)

Marine Order 47 (Offshore industry units) (Commonwealth of Australia)

Offshore petroleum and greenhouse gas storage (safety) regulations 2009 (Commonwealth of Australia)

Offshore Standard DNV-OS-E406 Design of free fall Survival Crafts (Det Norsk Veritas)

PMAWHS312 Command the operation of survival craft, Release 1 (Australian government)

Pyrenees Venture: Free fall life boat testing, BNPB-00PY-R550-0013 (BHP)

Report of the investigation into the floating OCS facility – tension leg platform FPS Auger Survival Craft fall with loss of life on June 30, 2019, MISLE Activity Number: 6762997 (United States Coast Guard)

Review of Coast Guard's Final Report on the Floating OCS Facility – Tension Leg Platform FPS Auger Lifeboat Fall with Loss of Life on June 30, 2019 (National Offshore Safety Advisory Committee US)

Safe solution to NOPSEMA's additional assurance testing of platform escape capsules, IDRK.12.04.19 (Survival Systems International Australia)

Safer Together Survival Craft and FRC testing and personnel transfer safety improvement risk assessment: Report, Perth, Western Australia, Report R20011-STO-R-001 (Risk Acuity)

Standard R-002: Lifting equipment (NORSOK)

STCW VI/2 – Proficiency in survival craft, rescue boats and fast rescue boats (IMO)

UI SC267 Implementation of the requirements relating to Survival Craft release and retrieval systems (LSA Code Paragraph 4.4.7.6 as amended by resolution MSC.320(89), *Rev. 2*, (International Association of Classification Societies)

Appendix A: Accident statistics

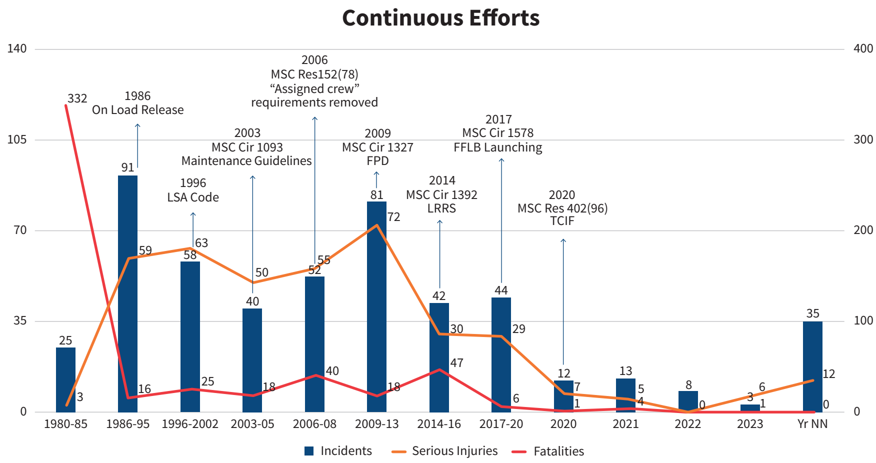

Figure A1: *IMO verified Lifeboat and Rescue Boat accidents 1980-2023 showing dates of significant IMO resolutions* (Source: InterManager, *Lessons Learned and Safety Issues Identified from the Analysis of Marine Safety Investigation Reports, The analysis of life boat and rescue boats incidents.* 20 May 2023*)*

InterManager notes: "Given increased transparency within the industry together with more efficient reporting and investigating, the number of accidents captured is increasing. However, there remains a natural lag between the accident occurring, being investigated and the report released. This means that the data set for recent years will, by its nature be incomplete, and depict an evolving landscape."

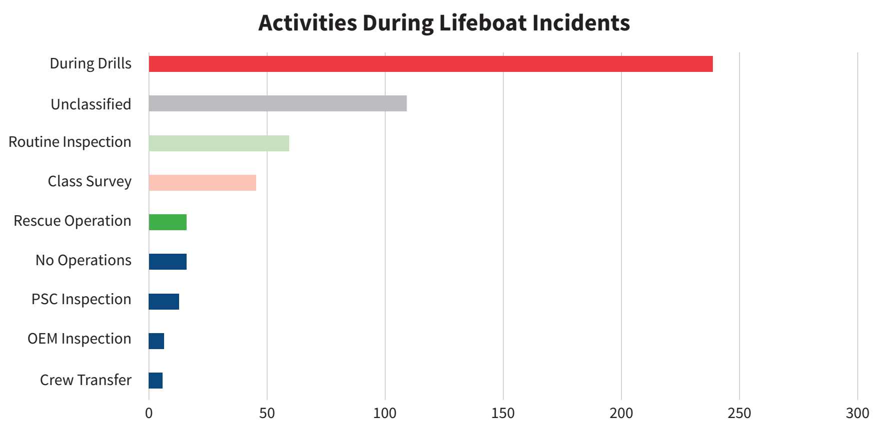

Figure A2: *Incident statistics by activity from 1981 through to 2023* (Source: InterManager, *Lessons Learned and Safety Issues Identified from the Analysis of Marine Safety Investigation Reports, The analysis of life boat and rescue boats incidents.* 20 May 2023*)*

Our vision
A global marine industry that causes no harm to people or the environment

Oil Companies
International Marine Forum
29 Queen Anne's Gate
London SW1H 9BU
United Kingdom

T +44 (0)20 7654 1200
E enquiries@ocimf.org

ocimf.org