

MCIB

Marine Casualty Investigation Board
Bord Imscrúdú Taisní Muirí



**REPORT OF AN
INVESTIGATION INTO THE
FIRE ON AND LOSS OF THE
'FV KAYLEIGH'
SOUTHWEST OF
SHEEPS HEAD, CO. CORK
4th MARCH 2020**

**REPORT NO. MCIB/298
(No.11 OF 2020)**

The Marine Casualty Investigation Board (MCIB) examines and investigates all types of marine casualties to, or on board, Irish registered vessels worldwide and other vessels in Irish territorial waters and inland waterways.

The MCIB objective in investigating a marine casualty is to determine its circumstances and its causes with a view to making recommendations to the Minister of Transport - for the avoidance of similar marine casualties in the future, thereby improving the safety of life at sea and inland waterways.

The MCIB is a non-prosecutorial body. We do not enforce laws or carry out prosecutions. It is not the purpose of an investigation carried out by the MCIB to apportion blame or fault.

The legislative framework for the operation of the MCIB, the reporting and investigating of marine casualties and the powers of MCIB investigators is set out in the Merchant Shipping (Investigation of Marine Casualties) Act, 2000.

In carrying out its functions the MCIB complies with the provisions of the International Maritime Organisation's Casualty Investigation Code and EU Directive 2009/18/EC governing the investigation of accidents in the maritime transport sector.



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Glossary of Abbreviations and Acronyms

ALB	All Weather Lifeboat
BIM	Bord Iascaigh Mhara
CGR	Coast Guard Radio
CoP	Code of Practice: Design, Construction, Equipment and Operation of Small Fishing Vessels of less than 15 m Length overall (2014)
DAFM	Department of Agriculture Food and the Marine
DOS	Declaration of Survey
DSC	Digital Select Calling
EPIRB	Emergency Position Indicating Radio Beacon
ETA	Estimated Time of Arrival
FSS	Fire Safety Systems
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System
GRP	Glass Reinforced Plastic (vessel construction)
GT	Gross Tonnage ^{*Note 1}
IMA	Irish Maritime Administration
IMO	International Maritime Organisation
IRCG	Irish Coast Guard
LOA	Length Overall
MN	Marine Notice
MRCC	Marine Rescue Coordination Centre
MRSC	Marine Rescue Sub-Centre
MSO	Marine Survey Office
RNLI	Royal National Lifeboat Institution
SFLA	Sea Fish Licensing Authority
S.I.	Statutory Instrument
UK	United Kingdom
UTC	Co-ordinated Universal Time
VHF	Very High Frequency

Kilometres	km
Kilowatts	kW
Litres	(lts)
Metres	m
Nautical miles	NM

*Note 1: Gross Tonnage is a nonlinear measure of a ship's overall internal volume. In the regulations which govern the measurement of ships the 'tonnage' measurement is one of capacity, the unit of one ton being a capacity measurement of 100 feet cubed (ft³). Gross Tonnage should not be confused with measures of mass or weight such as deadweight tonnage or displacement.

Gross Tonnage is calculated based on 'the moulded volume of all enclosed spaces of the ship' and is the total internal capacity of a ship measured from the top of floors or ceiling to the tonnage deck including the fore and aft peak tanks above the floors. Gross Tonnage is used to determine issues such as a ship's manning regulations, safety rules, registration fees and port dues.

Gross tonnage is defined by the International Convention on Tonnage Measurement of Ships, 1969, adopted by the International Maritime Organization (IMO) in 1969, and came into force on 18 July 1982.

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1. SUMMARY

- 1.1 On the evening of the 3rd of March 2020 a fishing vessel 9 nautical miles (NM) southwest off Sheeps Head with two crewmen on board was fishing when a fire broke out in the vessel's engine compartment. The crew suffered burn injuries. The fire continued in the engine compartment and the vessel started to take in water.
- 1.2 The Skipper issued a Mayday distress call on VHF at 23:10 hours (hrs) that the boat was on fire and taking on water. The fishing vessel's Emergency Position Indicating Radio Beacon (EPIRB) was activated at 23:21 hrs when the crew abandoned the vessel and boarded an inflatable life raft. The EPIRB transmission identified the vessel as the *'FV Kayleigh'*.
- 1.3 Castletownbere RNLI lifeboat was the first on the scene and at approximately 23:58 hrs picked up the two injured crew from their life raft and immediately proceeded to Castletownbere to transfer the crewmen ashore for medical treatment. Irish Coast Guard rescue helicopter R115 airlifted the two injured crewmen to Cork Airport for onward transfer by ambulance to Cork University Hospital (CUH) for treatment.
- 1.4 The fishing vessel was abandoned and adrift and presumed to have sunk sometime early on the 4th March.

Note all times are local time = Co-ordinated Universal Time (UTC)

2. FACTUAL INFORMATION

2.1 Vessel Details

Name:	'FV KAYLEIGH'.
Port of Registry:	Skibbereen.
Registered Number:	S220.
Official Number:	404502.
Call Sign:	EIGF2.
Radio Certificate No:	LRC281.
Type:	Fishing Vessel.
Purchased:	2008, Portavogie, Co. Down, Northern Ireland, UK.
Description of vessel:	Net hauler forward to starboard. Steel aft gantry with net drum and landing derrick. Winch on deck. Partial aluminium shelter.
Length Overall:	13.26 metres (m).
Breadth:	5.0 m.
Depth:	2.3 m.
Freeboard (arrival):	0.45 m.
Tonnage:	26.2 gross tonnage (GT).
Maker:	Cygnus Marine Ltd. UK.
Date Keel Laid:	1987.
Construction/Materials:	Glass Reinforced Plastic (GRP) hull and superstructure with partial aluminium shelter on weather deck. The vessel had two timber bulkheads. One forward, extending from the keel to the top of the wheelhouse thereby dividing the engine compartment from the fish hold. Included in this bulkhead was a large hatch to enable services to large machinery items in the engine

compartment. A second bulkhead further aft was fitted between the fish hold and the steering compartment. Neither bulkhead was declared watertight.

Engine: Cummins N855.

Engine Power: 145 kilowatt (kW).

Fuel Type: Diesel fuel oil.

Type of fishing: Trawling targeting white fish, i.e. cod, haddock, hake, monkfish etc.

Code of Practice Compliance: CoP Declaration of Compliance (DoC) issued 10th June 2016 valid to 9th June 2020. Description of operational area: South and West Coasts within 15 miles of shore.

Sea Fishing Licence: Issued 13th June 2019, valid until 30th June, 2020.

(see Appendix 7.1 Photograph No.1 'FV Kayleigh', Photograph No.2 Fishing trawl gear and nets.)

2.2 Crew Details

Number of Crew: 2.

Skipper: Male, (between 25 - 65 years). Declared owner of the vessel.

Qualified with a Second-Hand Limited Certificate of Competency, issued 1997. Fire Fighting Course at Greencastle in late 1990s with firefighting refresher course soon thereafter.

Crewman: Male, (25 - 65 years). Regular crewmember. Fishing Vessel Basic Safety Training Certificate.

2.3 Safety Equipment

As according to the CoP DoC, issued 10th June 2016:

- A smoke detector alarm and a carbon dioxide detector alarm were fitted in the crew cabin.

2.4 Voyage Particulars

The vessel departed the home port of Castletownbere at approximately 06:00 hrs on the morning of the 3rd March 2020 to fish south of Sheeps Head, Co. Cork. The vessel, using a trawl net, first shot its net at approximately 07:15 hrs and continued fishing throughout the day. The Skipper intended to return to Castletownbere on completion of the fishing trip.

2.4.1 Details of incident area

Sheeps Head peninsula is situated between Bantry Bay and Dunmanus Bay in Co. Cork, Ireland. The 'FV *Kayleigh*' was fishing south west of Sheeps Head, 6 to 7 nm south of Black Ball Head when the incident occurred.

(see Appendix 7.2 Sea Area Charts, Fig.1 Coast of SW Ireland; Fig.2 Mayday position.)

2.5 Type of Marine Casualty

This was a serious marine casualty resulting in a major fire on board a fishing vessel, serious injury to the crew, the presumed sinking of the fishing vessel and risk to the rescuers.

2.6 Emergency Response

Note - all times are local = UTC

03rd March 2020

23:10 hrs Bantry Coast Guard Radio (Bantry CGR) received a MAYDAY distress call from a vessel in position 51° 28.24N, 010° 04.13'. "Vessel on fire. Taking on water. Abandoning vessel to life raft. 2 People on board".

23:12 hrs MRSC Valentia request Castletownbere RNLI Lifeboat (LB) to call out.

23:13 hrs MRSC Valentia request Shannon based rescue helicopter R115 (R115) to call out.

23:18 hrs Bantry CGR issued a MAYDAY Relay requesting all ships in the area to assist.

23:21 hrs Castletownbere Lifeboat (LB) launched on service.

23:21 hrs UKMCC to NMOC, MRCC (Dublin) EPIRB alert: 'FV *Kayleigh*'/EIGF2. Position 51° 28.33'N 010° 04.53W.

- 23:23 hrs Naval Patrol '*L.E. James Joyce*' responded and proceeded to the incident.
- 23:44 hrs '*L.E. James Joyce*' ETA 50 minutes.
- 23:52 hrs Helicopter R115 airborne to incident.
- 23:53 hrs LB has the life raft with 2 crew in sight.
- 23:58 hrs LB has 2 crew on board. Both had burns and needed medical attention.

04th March 2020

- 00:02 hrs Helicopter R115 requested to medevac the 2 crew to CUH.
- 00:03 hrs LB reported that fishing vessel remained afloat although down by the head (bows) and that it was not known if the vessel was still on fire.
- 00:12 hrs '*L.E. James Joyce*' was requested to check out the fishing vessel.
- 00:29 hrs Helicopter R115 on approach to Castletownbere. LB was reported as seen by the helicopter approaching Ardnakinna (west entrance to Bearhaven and approximately 3 nm from Castletownbere).
- 00:35 hrs Helicopter R115 landed Castletownbere.
- 00:38 hrs LB landed 2 injured crew ashore for transportation directly to the helicopter R115.
- 00:42 hrs '*L.E. James Joyce*' reported '*FV Kayleigh*' remained afloat, not looking like sinking but down by the bows.
- 00:57 hrs Bantry CGR issued MAYDAY cancel, with additional information that the '*FV Kayleigh*' was adrift and '*L.E. James Joyce*' was standing by the vessel.
- 01:18 hrs Helicopter R115 airborne on-route to Cork Airport for onward transfer of the 2 injured crewmen by ambulance to Cork University Hospital (CUH).
- 01:38 hrs '*L.E. James Joyce*' - FV position 51° 28.24'N 010° 04.43'W drifting 0.3kn E. "Vessel does not seem to be on fire. Still afloat only bow is sunken". '*L.E. James Joyce*' released to standby Lawrences Cove, Bearhaven.
- 02:01 hrs Radio Navigation Warning and position for drifting fishing vessel issued.
- 08:36 hrs IRCG rescue helicopter R117 tasked to locate drifting fishing vessel.

10:24 hrs R117 on scene. Oil slick reported but no sign of vessel or debris. Presumed vessel has sunk.

2.6.1 Shore Authorities Involvement and SAR responders

Co-ordinating instructions were issued from:

23:43 hrs 3rd March 2020 Marine Rescue Sub-Centre (MRSC) Valentia

02:30 hrs 4th March 2020 Marine Rescue Coordination Centre (MRCC) Dublin, (monitor).

Bantry CGR.

UK MRSC.

MRSC Valentia

RNLI Castletownbere Lifeboat (Castletownbere LB).

Coast Guard rescue helicopter R115 and R117.

Naval Service patrol vessel '*L.E. James Joyce*' P62.

Castletownbere Coast Guard Unit.

Cork University Hospital.

Cork Airport.

2.7 Environmental Pollution

2.7.1 Oil pollution: The '*FV Kayleigh*' had diesel and hydraulic oil of unknown quantities onboard.

IRCG rescue helicopter R117 reported oil on the sea in the area of the last known position of the '*FV Kayleigh*' and that the vessel was presumed sunk. There was no debris found.

2.7.2 Fishing gear pollution: The '*FV Kayleigh*' was fishing at the time of the fire. A fishing trawl net was deployed from the vessel and remained attached to the vessel when it was presumed sunk and therefore remains on the sea bottom in close proximity and attached to the wreck.

(see Appendix 7.1 Photograph No. 2 Fishing trawl gear, Photograph No.3 Oil pollution.)

2.8 Weather and Tide

2.8.1 Met Éireann estimate of weather and sea state conditions between 18:00 and 23:59 hours UTC on Tuesday, 3rd March 2020 for an area 9 NM southwest of Sheeps Head.

- Weather: Rain and drizzle. Some mist patches possible.
- Temperature: 7 - 8 degrees Celsius (0C), dropping to 5 -60 C later.
- Wind: A light to moderate southwest breeze backed south to south-east.
- Mean speeds 8 to 28 km/h (4 - 15 knots).
 - Infrequent gusts up to 40 km/h (21 knots) may have occurred.
- Visibility: Good at first, decreased moderate or poor in rain, drizzle or mist.
- Sea State: Rough (2.5 to 4 m significant wave height).
- M3 weather buoy @ 18:00/21:00:
- Significant wave height. ~ 3.5 m.
 - Mean wave direction: west-northwest (~300 degrees).
 - Zero - crossing mean wave period: 8.5 seconds.
 - Sea temperature ~100C.

(see Appendix 7.3 - Fig.1 Met Éireann Estimate of Weather and Sea-State conditions off Sheaps Head.

Fig. 2 Met Éireann Sea Map and Wind Scale.

Fig. 3 Met Éireann Sea States and Visibility Scale.)

2.8.2 Tide information: source: www.tidetimes.co.uk Black Ball Harbour 20200303 UTC for Tuesday 3rd October, 2020 at Black Ball Harbour, Co. Cork.

LOW TIDE: 04:13 hrs HEIGHT: 1.2 m.

HIGH TIDE: 10:20 hrs HEIGHT: 2.70 m.

LOW TIDE: 16:39 hrs HEIGHT: 1.30 m.

HIGH TIDE: 22:48 hrs HEIGHT: 2.70 m.

Sunrise: 07:18 hrs Sunset: 18:25 hrs.

Moonrise: 11:13 hrs Moonset: 02:51 hrs.

(see Appendix 7.3 - Fig.4 Tide times Black Ball Harbour.)

3. NARRATIVE

3.1 The 'FV Kayleigh' was a Cygnus 44 constructed in the UK in 1987. These craft are heavy displacement vessels of GRP construction designed to be suitable for a range of fishing methods. Working boats of this manufacture type are very popular in the fishing industry and over 600 vessels were built specifically for fishing.

3.1.2 The shelter deck was fitted by a previous owner in Scotland. The Skipper bought the vessel in Northern Ireland and had owned it since 2008. The present arrangement was the same as when bought. A net hauler and winch were installed in 2014 when the vessel was rigged for fishing herring.

(see Appendix 7.1 Photograph No.2 Fishing trawl gear and nets.)

3.1.3 The engine compartment was located immediately below the wheelhouse deck and aft of the crew cabin. Access to the engine compartment was through a hatchway mounted in the floor of the wheelhouse on the port side. The hatch was GRP with thick insulation fitted to the inside surfaces. A vertical ladder descended from the hatchway to the engine compartment port side floor plates at the forward end of the engine. Floor plates extended around the engine. The engine compartment contained:

- Two fuel oil tanks located Port and Starboard.
- One hydraulic oil tank located right forward under the crew cabin compartment with hydraulic pump and a power take off clutch from the engine between the tank and front end of the engine. The hydraulic oil hoses led aft down the starboard side of the engine compartment.
- An engine starting 12 Volt (V) battery bank located inboard of the starboard fuel tank.
- A 24V hydraulic steering motor with directional relay solenoid control unit mounted on top of the fuel tank. Hydraulic steering pipes leading aft through the aft bulkhead.
- A general Service 12V battery bank located starboard side behind and above the starter battery bank.
- Marine diesel propulsion engine. Engine exhaust manifold on the upper starboard side of engine below the injector fuel return pipelines. Electric starter motor starboard side of the engine at floor plate level. The fishing vessel's engine was given a major overhaul in 2017.
- The main engine injector fuel return pipes located on the starboard side of engine top leading aft to a tee-piece dividing the fuel return line between the port and starboard fuel tanks.
- The engine sea water intake was mounted to the hull bottom on the starboard side and led vertically via a hull mounted non-return shipside valve and 2-inch

diameter stainless steel pipe to the intake mud box/seaweed strainer located at floor level between the engine starter and starter battery bank. The seawater pipe was then directed inboard towards the engine and connected to a flexible plastic hose attached directly to the engine seawater cooling intake at the starboard forward end of the engine under the engine mounted seawater circulating pump. The seawater intake arrangement was below the vessels water line.

- A small electric bilge pump located under the floor plates in the bilges.

(see Appendix 7.4 - Fig.1 Sketch of the General Arrangement - '*FV Kayleigh*'.
Fig.2 Cummins Engine - General arrangements
Fig.3 Sketch - Seawater Intake pipe arrangement.)

- 3.2 The trawler '*FV Kayleigh*' departed the fishing port of Castletownbere at approximately 06:00 hrs on the morning of the 3rd March, 2020 to fish south of Sheeps Head. The vessel had onboard two crewmembers including the Skipper who had owned the boat since 2008. Both crewmembers were very familiar with the equipment and operation of the fishing vessel.
- 3.2.1 Fishing commenced at approximately 07:15 hrs and continued throughout the day. The vessel was boarded by a Naval Service fishery patrol boarding party on routine inspection checks at approximately 11:00 hrs. All was in order and the boarding party returned to the naval patrol ship. The crew of the '*FV Kayleigh*' continued fishing.
- 3.2.2 The third trawl was shot that evening at approximately 19:15 hrs. There was a big sea swell running and it was dark. The crew cleaned the fish from the previous catch, had some dinner and the crewmember retired to the cabin to rest. The crew cabin is located in the bows of the vessel under the small foredeck and above the engine compartments hydraulic oil tank. The Skipper remained on watch in the wheelhouse. While the third trawl was in progress, (trawl net deployed and vessel towing the trawl net), sometime between 22:00 hrs and 22:30 hrs the crew cabin smoke detector alarm activated.
- 3.2.3 The crewmember resting in the cabin reported that there was some smoke in the cabin but no fire. There were no other smoke detectors located on board the vessel. In the wheelhouse, the Skipper, investigating the source of the smoke, turned on the engine compartment lights and lifted the engine compartment hatch cover located in the port side of the wheelhouse. He immediately saw a fire in the vicinity of the starboard side of the engine. The Skipper could not determine the source of the fire before he closed down the hatch in order to contain the fire in the compartment.

The Skipper shouted an alarm to the crewmember and proceeded to close down the engine compartment to starve the fire of fuel and air. His first action was

pulling the emergency fuel shut-off steel wire cord, thereby closing the remote operated fuel valves and stopping fuel flowing to the engine from the fuel tanks. The Skipper stated that the engine started chugging and shut down shortly afterwards. Meanwhile the Skipper closed down the engine compartment ventilation flaps located aft of the wheelhouse and on deck behind the wheelhouse entrance door. By now the crewmember was dressed and out of the crew cabin. He assisted the Skipper to prepare to fight the fire. All fire extinguishers were brought out of the cabin and supplemented by another dry powder and a CO2 extinguisher in the wheelhouse. The crew donned their heavy work clothes to give added protection and prepared to open the engine compartment hatch in the wheelhouse to fight the fire.

- 3.2.4 The Skipper stated that he was only guessing whether the fire was still burning after they had closed the vents and shut down the engine as there was no means of checking. The hatch was the only quick means of access into the compartment. There was no remote means of fighting the fire. They could feel no significant heat from around the hatch or the deck indicating a large fire in the compartment (the deck and hatch had insulation on the inside surfaces). The crew estimated that these actions took between 5 to 6 minutes before they felt ready. When all was prepared the Skipper, with the other crewmember ready behind with the extinguishers, opened the engine compartment hatch. The Skipper and crewmember stated that, in the heat of the moment, they forgot the principle of keeping as low as possible when attempting a hatch entry into a compartment containing a fire in order to avoid the predicted fireball. The Skipper stated that when he opened the hatch a fireball immediately erupted out through the opening and engulfed the two crewmembers resulting in burns to both their upper bodies, arms and heads. Their hair was on fire. While both crewmembers suffered burns the Skipper's burns were worse due his closer proximity to the opened hatch and fireball.
- 3.2.5 According to the Skipper the fireball was accompanied by a small explosion which dislodged all the instrument and chart-plotter screens in the wheelhouse and blew the wheelhouse lights out. Both crewmembers exited the wheelhouse in order to clear themselves and extinguish the fires on their persons. They were both shocked and disorientated for some time. They stated that during this time the engine compartment hatch remained open, thick black smoke continuously issued from the engine compartment but there were no flames visible.
- 3.2.6 The engine room bilge alarm activated at some point. The Skipper re-entered the wheelhouse and switched on the engine compartment's small electric bilge pump. The Skipper stated that the electric bilge pump electrical supply was from the General Service battery bank. The Skipper was able to hear water 'sloshing' around in the engine compartment and directed the crewmember to bring down the life raft and the EPIRB from its housing on the wheelhouse roof.

- 3.2.7 The crew made preparations to abandon the vessel. The life raft and EPIRB were readied for deployment and activation. Before abandoning the vessel, the crew paused and took stock of the situation. With the aid of a powerful hand lamp they could see water in the engine compartment to the height of the bottom rungs of the ladder but could not see the source of the flood water. The vessel had started “lurching” with the large amount of water in the compartment and they had growing concerns regarding the vessels deteriorating stability. The Skipper broadcast a MAYDAY on VHF radio, Channel 16, at 23:10 hrs. The crew donned PFDs, deployed the life raft and climbed into it before casting off from the fishing vessel and activating the vessel’s EPIRB.
- 3.2.8 The broadcast Mayday was received and answered by Bantry Coast Guard Radio (CGR). The Mayday informed the vessel’s position and description with two people on board. The vessel had a fire and was taking water and the crew were abandoning the vessel and taking to the life raft. At some time shortly before 23:21 hrs the crew activated the EPIRB.
- 3.2.9 At 23:55 hrs the crew of the ‘*FV Kayleigh*’ were found and taken from their life raft by Castletownbere Lifeboat and due to their serious burn injuries were immediately taken ashore to Castletownbere. The Coxswain of the Castletownbere Lifeboat reported that he viewed the ‘*FV Kayleigh*’ from approximately 300 metres away. He did not see any fire on board the vessel which was still afloat but was down by the head when they departed the scene of the incident.
- 3.2.10 The injured crew were taken to Castletownbere where they were transferred to IRCG rescue helicopter R115 which airlifted them to Cork Airport where they arrived at 01:44 hrs. The two crewmembers were immediately taken to Cork University Hospital (CUH) by ambulance for treatment and hospitalisation.
- 3.2.11 The Naval Patrol vessel ‘*L.E. James Joyce*’ had been tasked to stand-by the adrift ‘*FV Kayleigh*’ and reported at 01:38 hrs that the vessel did not seem to be on fire, was still afloat and only the bow was “sunken”. The naval ship was released from its stand-by task and the fishing vessel was left adrift and unattended for the night.
- 3.2.12 The following day at 08:36 hrs IRCG rescue helicopter R117 was tasked to locate the ‘*FV Kayleigh*’ at its last known position. Rescue helicopter R117 subsequently reported at 10:24 hrs that they were on scene and reported an oil slick but there was no sign of the vessel or debris and presumed the vessel had sunk.
- 3.2.13 There have been no subsequent sightings reported of the ‘*FV Kayleigh*’ and the vessel is presumed sunk at the time of this report.

3.3 Safety Standards onboard: The ‘*FV Kayleigh*’, registered number S.220, completed a CoP Declaration of Compliance (DoC) inspection and survey on the 10th June, 2016. This DoC was certified as valid to 9th June 2020.

(Please see Appendix 7.5 - Declaration of Compliance
 Fig.1 CoP DoC Vessel details
 Fig.2 CoP DoC Fire Safety
 Fig.3 CoP Declaration of Compliance.)

3.3.1 With regard to fire safety and fire prevention, according to the CoP DoC survey in June 2016 the following measures were certified as being in place:

- The engine compartment was capable of being closed down including closure of ventilation systems and hatchways.
- The exhaust pipes and ducts were adequately insulated to avoid igniting combustible materials and protected from damage.
- Wherever practicable, provision was made to retain any oil leakages.
- 2 portable foam type fire extinguishers rated at 13A144B were allocated to the engine compartment.
- Remote controls for fuel tank valves operated from the wheelhouse.

3.3.2 According to the CoP DoC survey of the ‘*FV Kayleigh*’ in June 2016 the following lifesaving appliances were certified as being in place and were subsequently used in the incident:

- Lifejackets. Both crewmen were wearing Personal Flotation Devices (PFDs) when rescued.
- Inflatable life raft. The crew abandoned ship into the vessels life raft.

3.3.3 According to the CoP DoC survey of the ‘*FV Kayleigh*’ in June 2016 the following radio equipment was certified as being in place and were subsequently used in the incident:

- Emergency Position-Indicating Radio Beacon (EPIRB). The vessel’s registered EPIRB was deployed, activated and functioned as required.
- VHF radio installation. The Skipper broadcast a distress Mayday which was received by Bantry CGR and functioned as required.

3.3.4 Post Code of Practice Declaration of Compliance (DoC) survey

The main engine was given a major overhaul in 2017. Engine overhauls necessitate a significant disturbance to an engine’s exhaust pipes and ducts thermal insulation. Re-constitution of insulation to the accepted standard is an important item that is checked during a CoP DoC survey. CoP, Chapter 5 - Fire Protection, Detection and Extinction paragraph 5.1.2.3 refers.

3.3.5 Code of Practice Intermediate Declaration

According to the CoP paragraph 1.5.5.1 a Declaration of Compliance will normally be valid for four years from the date of completion of a satisfactory survey, subject to an Intermediate Declaration from the owner after two years that the vessel arrangements, fittings and equipment have been maintained in accordance with the CoP. The vessel was subject to a CoP DoC survey in 2016. According to paragraph 1.5.5.6 of the CoP a copy of this Intermediate Declaration must be forwarded to the Marine Survey Office (MSO) within two years after the DoC. Therefore, an Intermediate Declaration should have been completed by the 13th September 2018 and forwarded to the MSO. In addition, if there had been any changes to the condition of the vessel (including major overhauls of machinery), there is a requirement in the CoP for the owner to contact the CoP Authorised Person to ensure the CoP Declaration conditions remain valid. (Ref. Section 3.3.1 above and Section 1.5.4.2 of the CoP). The vessels, main engine was subject of a major overhaul in 2017.

The MSO has checked its records and the office has no record of an Intermediate Declaration being completed in 2018 for the '*FV Kayleigh*'.

4. ANALYSIS

4.1 The fire in the engine compartment was central to this incident. It is reasonably likely that the presumed loss of the *'FV Kayleigh'* was due to the fire on board the vessel on the night of the 3rd March 2020 when the crew were injured and the vessel was abandoned adrift and, when last seen, appeared to be sinking. There are several causes and effects that must be considered in order to understand how the fire on board *'FV Kayleigh'* might have originated, ignited, spread and was eventually extinguished.

4.2 The Origin of the Fire.

The fire in the engine compartment was first seen to have started at the starboard side of the engine. This would place the fire in the vicinity of:

- the engine's exhaust pipes on the starboard side of the engine.
- battery banks and heavy-duty electrical cables.
- the engine's seawater cooling plastic flexible pipes on the starboard side of the engine.
- the hull on the starboard side of the compartment.
- hydraulic hoses from the hydraulic pump and steering gear machinery.
- the engine injectors oil return pipe to the starboard fuel tank.

4.2.1 Main engines of fishing trawlers work at high mechanical loads when towing trawl nets. At high engine loads the temperature of the exhaust gases may typically be in the range 350 degrees Celsius (°C) to 500°C. The *'FV Kayleigh'* was trawling immediately prior to the incident and its engine would have been working at high load.

4.2.2 The engine's fuel oil and lube-oil systems operate at significant pressures and temperatures while the engine is operating. Likewise, hydraulic oil systems also operate at considerable pressures. Oil pipes and seals are known to have failed in operation resulting in oil at pressure spraying or leaking onto surrounding machinery, equipment and the engine. Leaks also puddle and collect in crevices or drain further into the engine compartment bilges.

4.2.3 The 'flashpoint' of oil is the minimum temperature at which the oil gives off flammable vapour which, on the application of a flame, will cause momentary ignition. A typical flashpoint for lubricating oil is approximately 230°C (closed flashpoint test). The 'fire point' of an oil is the temperature at which the volatile vapours given off from a heated sample of the oil is ignitable by flame application and will burn continuously. The fire point temperature can be anything up to about 40°C higher than the closed 'flashpoint' temperature for oils.

- 4.2.4 The temperature of the surfaces of the engine exhaust working at loads typically associated with a fishing vessel steaming ahead with a trawl net deployed (typically between 350°C to 500°C), would be in excess of the fire point of engine lubricating oil, (typically up to 270°C).

Engine oil coming into contact with exposed hot surfaces presented by the engine exhaust gas pipes or trunking will ignite. This occurrence is considered likely in this incident.

- 4.2.5 There were two sets of battery banks in close proximity on the starboard side and an electro-hydraulic steering gear controller on the top of the starboard fuel tank. An electrical short circuit across the controller's terminals or battery terminals or connections is possible if the vessel is moving in a heavy swell with loose equipment lying around close to this electrical equipment. Electrical short circuits produce amounts of sparks, very localised high temperatures and burning.

- 4.2.6 The engine compartment also contained a hydraulic power pack driven from the front of the engine and a motor driven electro-hydraulic steering system. The power pack and steering system had several hydraulic hoses connecting the engine driven hydraulic pump to the deck machinery (winches etc.) and the electro-hydraulic steering controller to the steering compartment. Hydraulic systems work at considerable pressures. A sudden leak would result in oil spraying the vicinity and machinery. The deck machinery was not in use during a trawl and it is reasonable to assume this system was shut down and lines were not pressurised. The electro-hydraulic steering system located on the starboard fuel tank was operating during the trawl and its small-bore hydraulic lines would contain oil at some pressure. The battery banks were also in operation keeping electrical systems 'live'. If there was waste oil or a leaking oil system in the vicinity and there was a short circuit, then there would be a risk of fire.

- 4.2.7 However, the electrical systems including the electro-hydraulic steering mechanisms were working correctly. There was no reported electrical equipment failure or steering failure prior to the incident. A malfunction or sudden drop in oil pressure would be immediately detected as the steering system would fail to respond to helm movements in the wheelhouse. The battery systems continued to provide electrical power and there were no battery alarms in the wheelhouse prior to the incident. An electrical system short circuit or electro-hydraulic steering system malfunction is therefore considered unlikely to be the origin of the fire.

4.3 The Ignition of the Fire.

The main engine of the 'FV *Kayleigh*' was given a major overhaul in 2017. Major overhauls necessitate general disruption among other components of the exhaust system and its insulation. There were no CoP safety surveys conducted

after 2017 to substantiate whether or not the exhaust system insulation was replaced to an accepted standard.

The vessel was engaged in trawling prior to the fire. Trawling induces high loads on the engine with resultant high exhaust temperatures sufficient to provide ignition to oil. It is considered likely that the ignition of the fire was due to leaking fuel oil or lubricating oil coming into contact with the hot engine exhaust pipes. The resultant fire established and travelled to the lower parts of the engine where oil leakages and oil waste were likely to have puddled and collected.

4.4 The Spread of the Fire.

The Skipper reported that he opened the engine compartment hatch and saw a fire on the starboard side of the main engine. Oil fires are intense and spread quickly if allowed sufficient air and fuel. Engine compartments, by design, must have a continuous supply of fresh air to allow the engine(s) to function correctly. An internal combustion engine consumes air (the oxygen component) in the combustion cycle and restricting air flow significantly reduces the engine's performance to the point where it will malfunction and eventually stop. The same applies to any combustion process or fire. Closing off the ventilation (and therefore air supply), to a compartment containing a fire causes that fire to abate. Although the fire abates, the source of ignition and its fuel supply remains at high ignition temperatures. Any reintroduction of air (oxygen) to the fire will cause rapid reignition and, in this case, likely result with a fireball as reported by the Skipper which he described as erupting out of the compartment followed by thick black acrid smoke.

The fireball badly burned the Skipper and the other crewmember and the hatch remained open while they tended their burns. More air would then have entered the compartment aiding the proliferation of the fire. The rapid reignition and fireball would indicate that the fire was established and had spread to other parts in the compartment prior to the ventilation being closed despite the fuel supply being shut off, the engine compartment vents closed and the engine stopped, i.e. the fire was being fuelled by some material or materials.

- 4.4.1 Oil, being a liquid will puddle into crevices, soaks into permeable materials such as rags, cardboard or paper and collect in bilges. Oil at normal ambient temperatures is unlikely to ignite. However, if this oil was enveloped by fire spreading from the engine exhausts then it would serve as fuel and the fire would become a conflagration and spread to the surrounds. The fire was large enough to produce a lot of heat with unburned volatile vapours evidenced by the fireball. It may be reasonably deduced that oil of some type, either puddled in crevices, soaked into waste materials or collected in the bilges, fuelled the fire adjacent to the starboard side of the engine, at least in its early stages.

4.4.2 The 'FV Kayleigh' was constructed of Glass Reinforced Plastic (GRP). GRP has two principle components, a thermoset plastic resin, generally polyester but sometimes epoxy, and glass fibre reinforcement. The proportions are typically 80% resin and 20% glass fibre. Hardened polyester binds the glass fibres together and forms the composite into a rigid, strong and watertight hull construction material. Plastic and the plastic polyester resin component of GRP burns intensely given the right conditions and produces amounts of black acrid smoke, similar to that as described by the crew issuing from out of the engine compartment hatch. Reference paragraph 3.2.4. It may reasonably be deduced that GRP in the hull construction and other plastic equipment parts (including flexible plastic hosepipes) in the engine compartment was a component, amongst others, of the fire (in its later stages) on the starboard side of the engine. Reference paragraph 3.1.3.

4.5 Duration and Extent of the Fire.

Smoke was detected in the crew cabin sometime between 22:00 hrs and 22:30 hrs when the smoke detector alarm sounded. The fire must have started before that time. The crew spent some time investigating the origin of the smoke before a fire was found in the engine compartment. The Mayday was broadcast at 23:10 hrs at which time the crew had looked into the compartment, observed the rising water level, deduced the vessel was sinking and decided to abandon ship. The crew estimated that ten minutes elapsed from the time they were burned to the Mayday broadcast. Therefore, it is deduced from the timeline that the fire had initiated sometime between 22:00 hrs and 22:30 hrs and burned for approximately 80 to 110 minutes before being extinguished at some time before 23:53 hrs.

Engine compartments contain an amount of plastic in the form of containers, fittings and hoses. Plastic is not fireproof. It burns and intrinsically fails in the presence of high temperatures. Plastic also burns intensely given the right conditions and produces amounts of black acrid smoke similar to as described by the crew. Reference paragraphs 3.1.3 and 3.2.4.

It is deduced that the fire on the starboard side of the engine was burning for approximately 80 to 110 minutes. It can also be reasonably surmised that the fire was initially fuelled by fuel oil or lubricating oil leaking from the engine oil systems and later established itself by burning other combustible materials in and around the lower starboard side of the engine compartment. It would therefore be reasonable to deduce that the seat of the fire was likely at the lower part of the engine probably at floor plates level and close to the GRP hull surfaces and the engine seawater cooling systems plastic flexible hose pipes.

4.6 The Extinguishing of the Fire.

Fires may be extinguished by removing any one component of the fire triangle

i.e. the fuel, ignition source or oxygen supply. A compartment fire onboard a ship is extinguished by:

- Starving the fire of oxygen by closing down the ventilation to the compartment and smothering the fire by the injection of an inert gas or foam smothering agent into the compartment to displace the air/oxygen contained within.
- Starving the fire of fuel by closing oil valves, stopping the engine or pump supplying the oil.
- Removing the source of ignition by either cooling the hot ignition surfaces or flooding the seat of the fire with water.

The vessel engine's primary cooling system was seawater cooled whereby seawater was drawn from the sea through a hull mounted valve, a strum box (mud box/seaweed trap) and flexible pipe connected to the starboard forward end of the engine and pumped through the engine's cooling water heat exchanger before being discharged overboard through a flexible pipe to the sea. Flexible pipes are commonly constructed of plastic with braided reinforcements. The engine cooling water intake connection was located at the forward end and low down near the floor plates on the starboard side below the vessel's waterline. It may reasonably be deduced that the plastic component in the flexible hose material was a component of the fire on the starboard side of the engine and burned through sufficiently to fail and allow seawater to enter the engine compartment.

(see Appendix 7.4: Fig.2 Cummins Engine - General Arrangement.
Fig.3 Seawater Intake - Sketch of pipe arrangement.)

- 4.6.1 The Coxswain of the Castletownbere Lifeboat stated that he saw no fire on the fishing vessel at 23:53 hrs but that there was clear evidence that a fire had occurred as the two crewmembers were suffering from burn injuries. Therefore, it may be deduced that the fire was extinguished at that time. Although the fishing vessel remained afloat it was in a bow sunk attitude indicating that the fire had resulted in some damage to either the hull or some internal component in the engine compartment that had compromised its watertight integrity and allowed a significant amount of water into the vessel. It is therefore reasonable to deduce that the flood in the engine compartment removed the source of ignition by smothering and cooling the hot ignition surfaces of the seat of the fire with water and extinguished the fire.

4.7 **Flooding - the cause of the presumed sinking of the fishing vessel.**

It is reasonable to deduce that the fire on board the fishing vessel caused the flooding of the engine compartment. There were no witnesses to, or reports of, the sinking of the 'FV *Kayleigh*'. However, there is circumstantial evidence to indicate why the vessel is presumed to have eventually sunk at, or close to, the location of the incident.

4.7.1 According to the Mayday broadcast at 23:10 hrs, the vessel was on fire and taking in water. Evidence would suggest that the initial flood was into, and appeared to be contained in, the engine compartment. The flood was rapid and of a significant amount such that the crew heard the water sloshing about and the fire was extinguished before the lifeboat arrived on scene. The influx of water reduced the vessel's stability to a condition that encouraged the crew to abandon the vessel. The fishing vessel was noticeably down by the bow when Castletownbere Lifeboat left the scene of the incident at 23:55 hrs.

4.7.2 The '*FV Kayleigh*' remained afloat with little change to its attitude as evidenced by the report from the '*L.E. James Joyce*' which reported thirty-nine minutes later at 01:38 hrs on the 4th March that the vessel was down by the head and did not appear to be sinking.

The '*FV Kayleigh*' was constructed in the UK by Cygnus Marine Ltd and it is not known as to what damage stability criteria this fishing vessel was constructed. The vessel may have been fitted with two watertight bulkheads each separating the engine compartment from the crew cabin forward and the fish hold aft. The minimum standard of 'one compartment flooding' would require watertight bulkheads and thereby allow the vessel to remain afloat unless flooding occurred in some other compartment.

4.7.3 In the case of Irish registered fishing vessels, there is no damage stability requirements under the CoP for Irish registered fishing vessels and watertight bulkheads are not required for fishing vessels of the size of '*FV Kayleigh*'. The CoP, Chapter 2, Construction, Structural Strength and Weathertight integrity, section 2.5.1 states 'Bulkheads are not a requirement for compliance with the Code (CoP), nor, if bulkheads are fitted, are they required to be watertight'.

(see Appendix 7.4: Fig.1. Sketch - General Arrangement of '*FV Kayleigh*'.)

The Skipper stated that the bulkheads of '*FV Kayleigh*' were not watertight. A flood in the engine compartment would eventually continue into adjacent compartments and the vessel would sink.

4.7.4 The '*FV Kayleigh*' was last seen afloat at 01:38 hrs. Later that day, at 10:24 hrs, IRCG rescue helicopter R117 flew to the incident site and reported that it was on scene but was unable to find the vessel or debris but sighted an oil slick in the vicinity. The vessel was unlikely to drift far from the incident scene as it was attached to the trawl net which was on the sea bottom presumably acting as an anchor. The vessel is presumed to have sunk at that position.

4.8 Crew Training Requirements.

Training requirements for the Skipper and crew on fishing vessels are set out in the CoP Section 8 and under S.I. (2001) 587 - Fishing Vessel Basic Safety Training

Regulations, 2001. These courses are arranged by Bord Iascaigh Mhara (BIM) and are three days in duration and include a firefighting module. Furthermore, refresher training was introduced on a five-year basis. Section 8.9.2 of the CoP requires that the master of a fishing vessel not less than 12 metres in length shall ensure that the crew are instructed, trained and drilled in the use of the life-saving and fire-fighting equipment on the vessel and that each member of the crew is aware of the location on the vessel of such equipment. The injuries sustained by the crew as they were engulfed by the fireball may have been avoided if the crew had remembered to carry out the procedures for entering a compartment known to contain a fire. These procedures are taught in the BIM firefighting module and refresher courses.

4.9 Code of Practice Requirements.

The MSO has no record of an Intermediate Declaration which was due in 2017 after the 'FV Kayleigh' engine overhaul, and again, two years after the DoC in 2018, which would state that the vessels arrangements, fittings and equipment have been maintained in accordance with the Code. Reference CoP DoC Chapter 1 paragraph 1.5.5.1.

4.9.1 Commercial fishing requires a fishing vessel to hold a Sea Fishing Boat Licence issued by the Licensing Authority of the Sea Fish Licensing Authority (SFLA), an office within the Department of Agriculture, Food and the Marine, (DAFM). The issue of a Sea Fishing Licence by the SFLA of DAFM is based on a number of requirements one of which is that fishing vessels comply with the requirements of the Merchant Shipping Acts. Specifically, for fishing vessels less than 15 m, they must comply with the requirements of the CoP and this is documented and endorsed by the issue of a Declaration of Compliance under the CoP. These requirements are set in the Sea Fisheries (Amendment) Act 2003 Section 4 as inserted by Section 97 of the Sea Fisheries and Maritime Jurisdiction Act 2006. The relevant requirement is as follows:

- “(9) (a) It is a condition of a sea-fishing boat licence that the licensee shall ensure that the licensed boat complies with requirements specified by or under the Merchant Shipping Acts 1894 to 2005.
- (b) Where by or under the Merchant Shipping Acts 1894 to 2005 a survey is required to be carried out of a sea-fishing boat for the purpose of establishing whether or not such boat complies with the requirements specified by or under those Acts, the licensing authority shall not grant or renew a sea-fishing boat licence in respect of the boat unless the licensing authority is satisfied that the boat complies with such requirements.
- (c) Where a code of practice published by the Minister for Transport relating to the safety and sea-worthiness of sea-fishing boats of a class

to which paragraph (b) does not apply requires a survey to be carried out of a sea-fishing boat of such class for the purpose of establishing whether or not such boat complies with the requirements specified in the code of practice, the licensing authority shall not grant or renew a sea-fishing boat licence in respect of the boat unless a declaration of compliance with the code of practice has been provided to the licensing authority.”.

- 4.10 The ‘*FV Kayleigh*’ was 13.26 m length overall. Fishing vessels less than 15 m are dealt with in Sections 9(a) and (b) above. The declaration documenting compliance has a validity of four years and this is dependent on a self-declaration by the owner after two years. Furthermore, the above requirement for a sea-fishing boat licence to be issued requires a valid declaration at the time of issue of the licence. It appears that in some cases the self-declarations are not being effectively carried out by owners.
- 4.10.1 The duration of the DoC of four years between CoP surveys is a long time which may provide good reason to justify a requirement for an independent survey of these particular fishing vessels every two years. This is the case with fishing vessels greater than 15 m which are covered by Section 9(b) above. Further consideration should be given to changing the period of validity of the declarations to two years and thus the link to the Sea Fishing Licence requirements would deliver a mechanism whereby owners would be required to obtain an independent survey every two years. In turn this would contribute to ensuring enhanced safety standards for the fleet in this sector.

5. CONCLUSIONS

- 5.1 At this juncture it is more probable than not that the source of the fire first seen by the Skipper when he first looked into the engine compartment was in the vicinity of the engine exhaust pipes or battery bank whereby lub-oil was ignited by the hot exhaust pipes and caught fire. The resulting fire would likely have followed the leaking oil which spilled over onto the lower part of the engine and floor plates. The fire in this area would likely be in direct contact with the engine seawater cooling flexible hose and the hull. The plastic materials of the hose and/or the hull caught fire and were burned through to a degree that the material(s) broke down, losing their intrinsic strength and allowed seawater to enter and flood the engine compartment. Thick black smoke emitting from the compartment after the fire ball supports the hypothesis that the plastic component of GRP hull and/or the plastic flexible pipes were on fire by the time the Skipper opened the hatch the second time and the crew were injured by the fireball.
- 5.2 It is surmised that the quantity of seawater in the compartment and the lurching movement of the vessel caused the fire to be extinguished by water sloshing around the compartment and over the fire. This hypothesis is supported firstly, by the report from the fishing vessel Skipper that he saw and heard water in the compartment and secondly, the report by the Lifeboat Coxswain that he saw no fire on the fishing vessel at 23:53 hrs.
- 5.3 The *'FV Kayleigh'* was abandoned, adrift and bow down when last seen at 01:38 hrs on the 4th March. The vessel is presumed to have eventually sunk sometime between 01:38 hrs when the vessel was last seen and 10:24 hrs when a helicopter search could not find the fishing vessel. Reasonable deduction would conclude that a slow flooding of the compartments adjacent to the engine compartment (due to a lack of watertight sub-division) would continue until the vessel lost positive buoyancy and sank.
- 5.4 The Intermediate Declaration required under the CoP was not carried out as required and therefore not returned to the MSO. It is necessary for owners to ensure that their vessel is maintained and operated in accordance with the requirements of the CoP as emphasised in Section 1.1.10 of the CoP. In this case almost three years had passed since the CoP DoC survey. The duration of the DoC of four years between CoP surveys is a long time and consideration should be given to requiring an independent survey of such fishing vessels every two years. Further consideration should be given to changing the period of validity of the declarations to two years and thus the link to the Sea Fishing Licence requirements would deliver a mechanism whereby owners would be required to obtain an independent survey every two years, thereby contributing to ensuring enhanced safety standards for the fleet in this sector. Sea Fishing Licences are issued on the basis that the declarations submitted with their applications are valid at the time of application.

- 5.5 The Maritime Safety Strategy 2015 - 2019 outlines the role and powers of the Irish Maritime Administration (IMA). Much of the IMA's work is focussed on preventing casualties and incidents on maritime vessels by setting guidelines and standards for vessels and seafarers, by inspections and certification, and by enforcement. The strategy notes that MCIB investigation reports indicate that there are similarities in the events which contribute to the loss of life in the maritime sector. Based on an analysis of MCIB reports on fatalities arising since 2002, combined with information from IRCG incident reports, ten factors have been identified which tend to arise most frequently. These are:
- The need for an enhanced maritime safety culture.
 - Unsuitable or inadequately maintained safety equipment on board, or lack thereof.
 - Lack of crew training.
 - Failure to plan journeys safely, including failure to take sea/weather conditions into account.
 - Non-wearing of personal flotation device (lifejacket/buoyancy aid).
 - Vessel unseaworthy, unstable and/or overloaded.
 - Inadequate enforcement of regulations.
 - Impairment due to fatigue or the influence of alcohol and/or drugs.
 - Inadequate crewing levels/solo operation.
 - Unsuitable clothing being worn on board.

Source: Based on MCIB reports 2002-2013 and IRCG Annual Statistics, combined.

- 5.5.1 Although the focus of the Strategy is on fatalities, similar factors contribute to incidents where there has been no loss of life as in the incident involving the *'FV Kayleigh'*. By tackling the factors highlighted, both fatalities and incidents overall may be reduced and would contribute to ensuring enhanced safety standards for the fleet in this sector. Each of the factors listed is important and it is often the case that multiple factors are identified in relation to each incident. Two of the factors listed above became apparent in the MCIB investigation into the circumstances of the fire aboard, and presumed sinking of, the *'FV Kayleigh'*. These are firstly, inadequate enforcement of regulations and secondly, lack of crew training, i.e.:
- Paragraph 4.9 above - Code of Practice requirements in the enforcement of the requirements in respect of the issue of Sea Fishing Licenses.
 - Paragraph 4.8 above - Crew training requirements in respect of BIM Firefighting modules and refresher courses.

6. SAFETY RECOMMENDATIONS

- 6.1 The Minister for Transport should remind the owners and operators of fishing vessel's less than 15 m Length overall of the:
- mandatory requirements contained in Marine Notice 49 of 2019 Fishing Vessel Safety Information highlighting the mandatory requirement for fishing vessels to be fitted with smoke/fire detection systems in engine rooms.
 - contents of Section 8.9.2 of the CoP that requires that the master of a fishing vessel not less than 12 metres in length to ensure that the crew are instructed, trained and drilled in the use of the life-saving and fire-fighting equipment on the vessel and that each member of the crew is aware of the location on the vessel of such equipment.
 - firefighting training requirements for crews onboard fishing vessels as set out in the CoP Section 8 and under SI (2001) 587 - Fishing Vessel Basic Safety Training Regulations, 2001 and to attend the related refresher training introduced on a five year basis.
- 6.2 The Minister for Transport should amend the requirements of the Code of Practice: Design, Construction, Equipment, and Operation of Small Fishing Vessels of less than 15 m length overall as follows:
- Declaration of Compliance (DoC) survey to include a compliance check in Chapter 5 of the DoC section 5.1 - 'Fire Safety' to include the installation and functionality of an efficient smoke detector system fitted in the machinery space.
 - Chapter 2, Materials for Valves and Associated Piping - Sea Water Systems, Section 2.18.3 to reflect that flexible hoses must be of sound and efficient installation and constructed with reinforced and non-flammable materials resistant to heat.
- 6.3 The Minister for Transport should amend the nature of the self-declaration required under the CoP Declaration of Compliance Chapter 1, paragraph 1.5.5.1. such that a requirement for an independent survey every two years with an associated two year validity of the intermediate Declaration is introduced which would state that the vessels arrangements, fittings and equipment have been maintained in accordance with the Code. Reference CoP DoC Chapter 1 paragraph 1.5.5.1.
- 6.4 The Minister for Agriculture, Fisheries and the Marine Sea Fishing Boat Licensing Authority should ensure that fishing vessels will continue to hold a valid CoP 'Declaration of Compliance' for the duration of the vessels Sea-Fishing Licence.
- 6.5 The Minister for Transport should empower the Irish Maritime Administration to enhance the administrations powers of enforcement, inspections and certification processes. (Action 29 of the Maritime Safety Strategy.)

7.	APPENDICES	PAGE
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Appendix 7.1 Photographs



Photograph No.1 - 'FV KAYLEIGH' S220.

Appendix 7.1 Photographs



Photograph No. 2 - Fishing trawl gear and nets.

Appendix 7.1 Photographs



Photograph No.3 - Oil pollution

Appendix 7.3 Weather and Tides



Met Éireann

The Irish Meteorological Service

Climate Services

Glasnevin Hill

Dublin 9

Seirbhísí Aeráide

Cnoc Ghlas Naíon

Baile Átha Cliath 9

Tel: +353-1-8064260

Fax: +353-1-8064216

Email: LEGAL@MET.ie

Our Ref. WS1730/2003_18

Your Ref. MCIB/12/298

Re: Estimate of weather and sea state conditions between 18:00 and 23:59 hours UTC on Tuesday 3 March 2020, for an area nine nautical miles to the southwest of Sheeps Head, Co. Cork (51.4722, -10.0755).

Synopsis: A moderate to fresh west to northwest airflow over Ireland eased as a weak ridge of high pressure built from the southwest. A weak depression of 996hPa approached from the southwest during the evening, and tracked eastwards close to the south coast by Wednesday morning.

Estimate of weather & sea state conditions*:

18:00 – 23:59 hours UTC:

<u>Weather:</u>	Rain and drizzle. Some mist patches were also possible.
<u>Temperature:</u>	7 to 8 degrees Celsius, dropping to 5 to 6 degrees Celsius later.
<u>Wind:</u>	A light to moderate southwest breeze backed south to south-east. <ul style="list-style-type: none"> • Mean speeds 8 to 28 km/h (4 to 15 knots) • Infrequent gusts up to 40 km/h (21 knots) may have occurred.
<u>Visibility:</u>	Good at first, decreased moderate or poor in rain, drizzle or mist.
<u>Sea State:</u>	Rough (2.5 to 4 m significant wave height). M3 weather buoy @18:00/21:00: <ul style="list-style-type: none"> • Significant wave height: ~3.5 m • Mean wave direction: west-northwest (~300 degrees) • Zero-crossing mean wave period: 8.5 seconds
<u>Sea Temperature:</u>	~10 degrees Celsius (M3)

Please address all correspondence to legal@met.ie and please kindly quote the reference number WS1730/2003_18

* This is based on provisional quality controlled data and subject to review.



Fig.1 - Met Éireann - Estimate of Weather and Sea State off Sheeps Head.

Appendix 7.3 Weather and Tides

Met Éireann
 The Irish Meteorological Service
 Climate Services Seirbhíse Aeráide Tel: +353-1-8064260
 Glasnevin Hill Cnoc Ghlas Naion Fax: +353-1-8064216
 Dublin 9 Baile Átha Cliath 9 Email: LEGAL@MET.ie

APPENDIX 1. Sea Area Map & Beaufort Scale of Wind

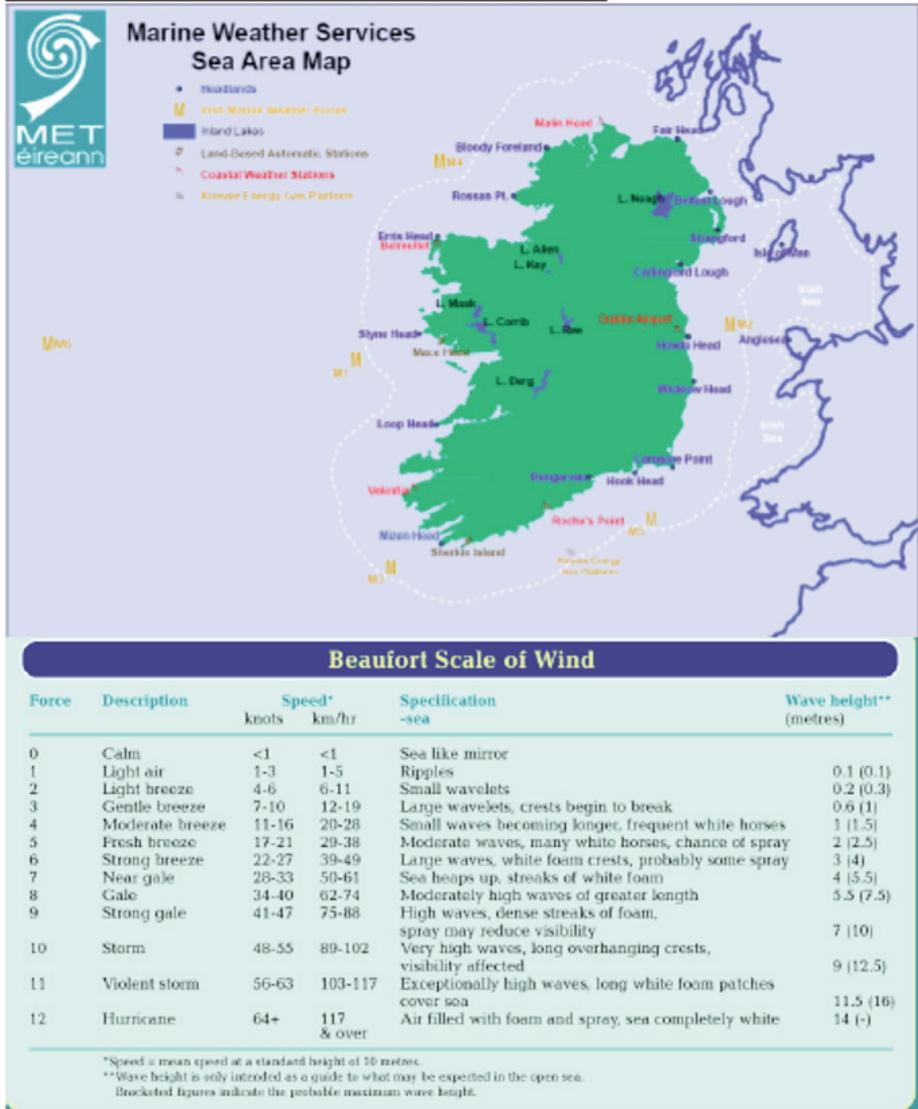


Fig. 2 - Met Éireann Sea Area Map and Beaufort Wind Scale.

Appendix 7.3 Weather and Tides



Met Éireann

The Irish Meteorological Service

Climate Services

Glasnevin Hill

Dublin 9

Seirbhísi Aeráide

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Baile Átha Cliath 9

Tel: +353-1-8064260

Fax: +353-1-8064216

Email: LEGAL@MET.ie

APPENDIX 2. Sea States & Visibility

Wave Heights / State of Sea:

The wave height is the vertical distance between the crest and the preceding or following trough. The table below gives a description of the wave system associated with a range of significant wave heights.

The Significant wave height is defined as the average height of the highest one-third of the waves. (It is very close to the value of wave height given when making visual observations of wave height.)

Sea State (Descriptive)	Significant Wave height in meters
Calm	0 – 0.1
Smooth (Wavelets)	0.1 – 0.5
Slight	0.5 – 1.25
Moderate	1.25 – 2.5
Rough	2.5 – 4
Very rough	4 – 6
High	6 – 9
Very high	9 – 14
Phenomenal	Over 14

Individual waves in the wave train will have heights in excess of the significant height. The highest wave of all will have a height about twice the significant height.

Visibility Descriptions:

Visibility (Descriptive)	Visibility in nautical miles (kilometres)
Good	More than 5 nm (> 9 km)
Moderate	2 – 5 nm (4 – 9 km)
Poor	0.5 – 2 nm (1 – 4 km)
Fog	Less than 0.5 nm (< 1km)

Please Note:

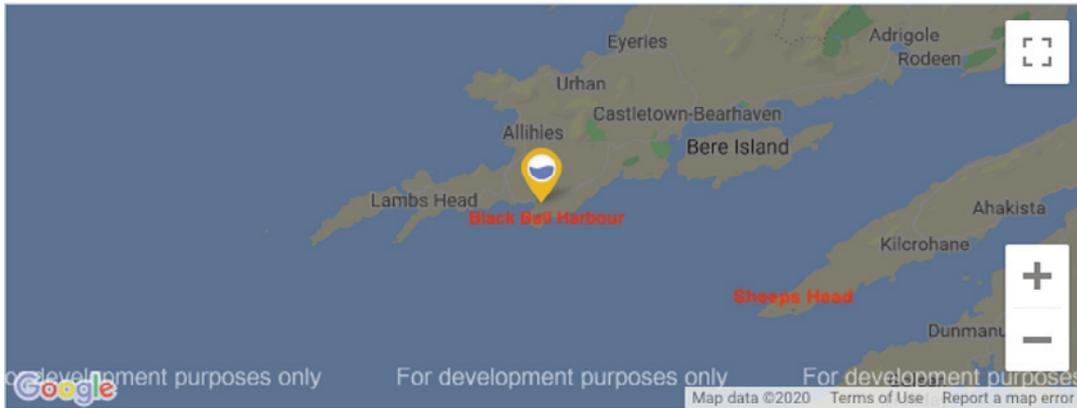
If there are no measurements or observations available for an exact location, then the estimated conditions in this report are based on all available meteorological measurements and observations which have been correlated on the routine charts prepared by Met Éireann.

Fig 3 - Sea States and Visibility scales.

Appendix 7.3 Weather and Tides

Black Ball Harbour Tide Times

Black Ball Harbour tide times are listed below, including sunrise and sunset times, moon rise and moonset times, and the current moon phase. Simply use the tide calendar to view tide times up to 6 days in advance.



Tuesday 3rd March, 2020

March 2020						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

LOW TIDE: 04:13	HEIGHT: 1.20m
HIGH TIDE: 10:20	HEIGHT: 2.70m
LOW TIDE: 16:39	HEIGHT: 1.30m
HIGH TIDE: 22:48	HEIGHT: 2.70m

<p>Waxing Quarter Moon</p>	SUNRISE: 07:18	SUNSET: 18:25
	MOONRISE: 11:13	MOONSET: 02:51

Fig.4 - Tide Times – Black Ball Harbour

Appendix 7.4 General Arrangements

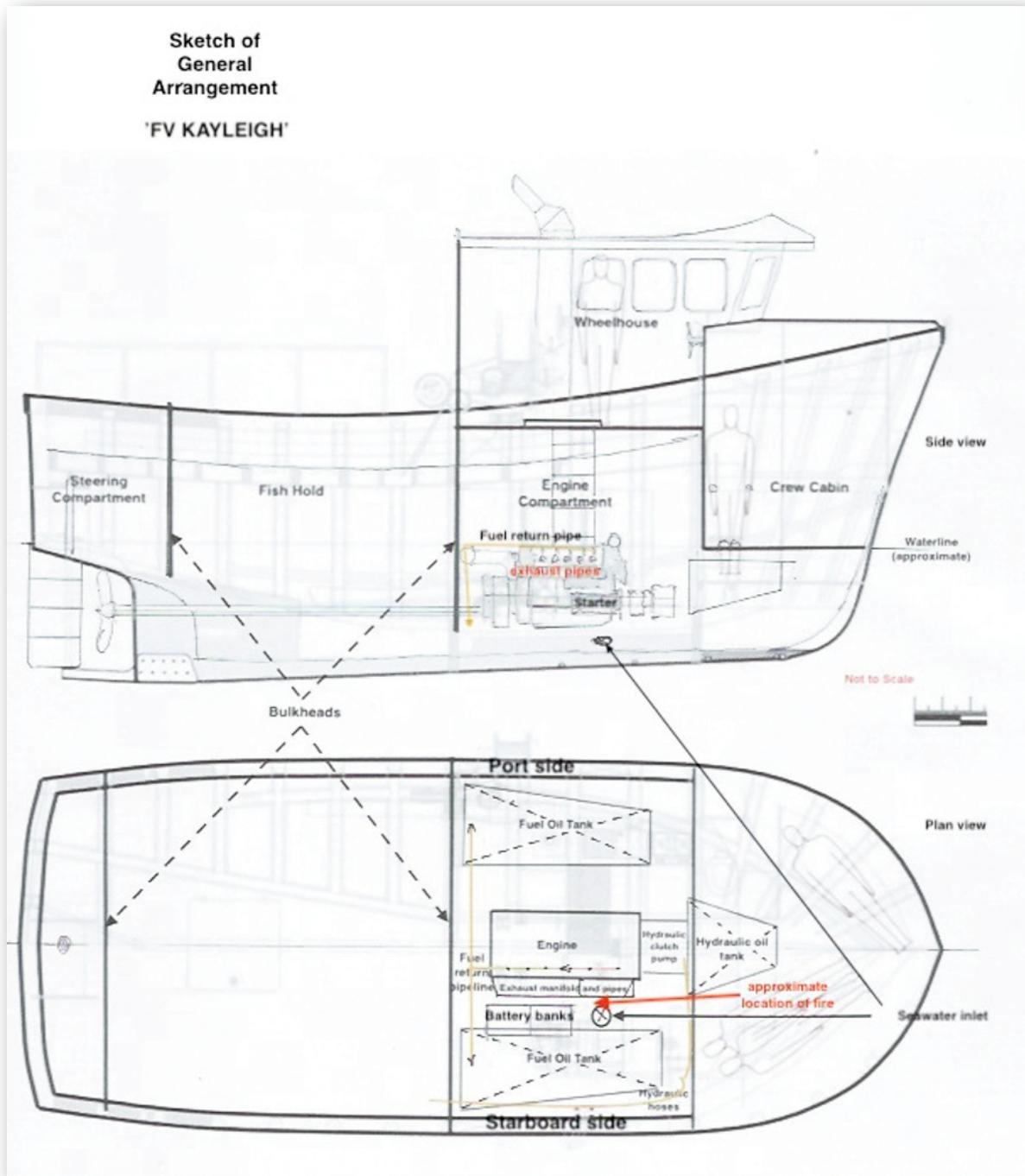


Fig.1 - Sketch: General arrangement 'FV Kayleigh'.

Appendix 7.4 General Arrangements

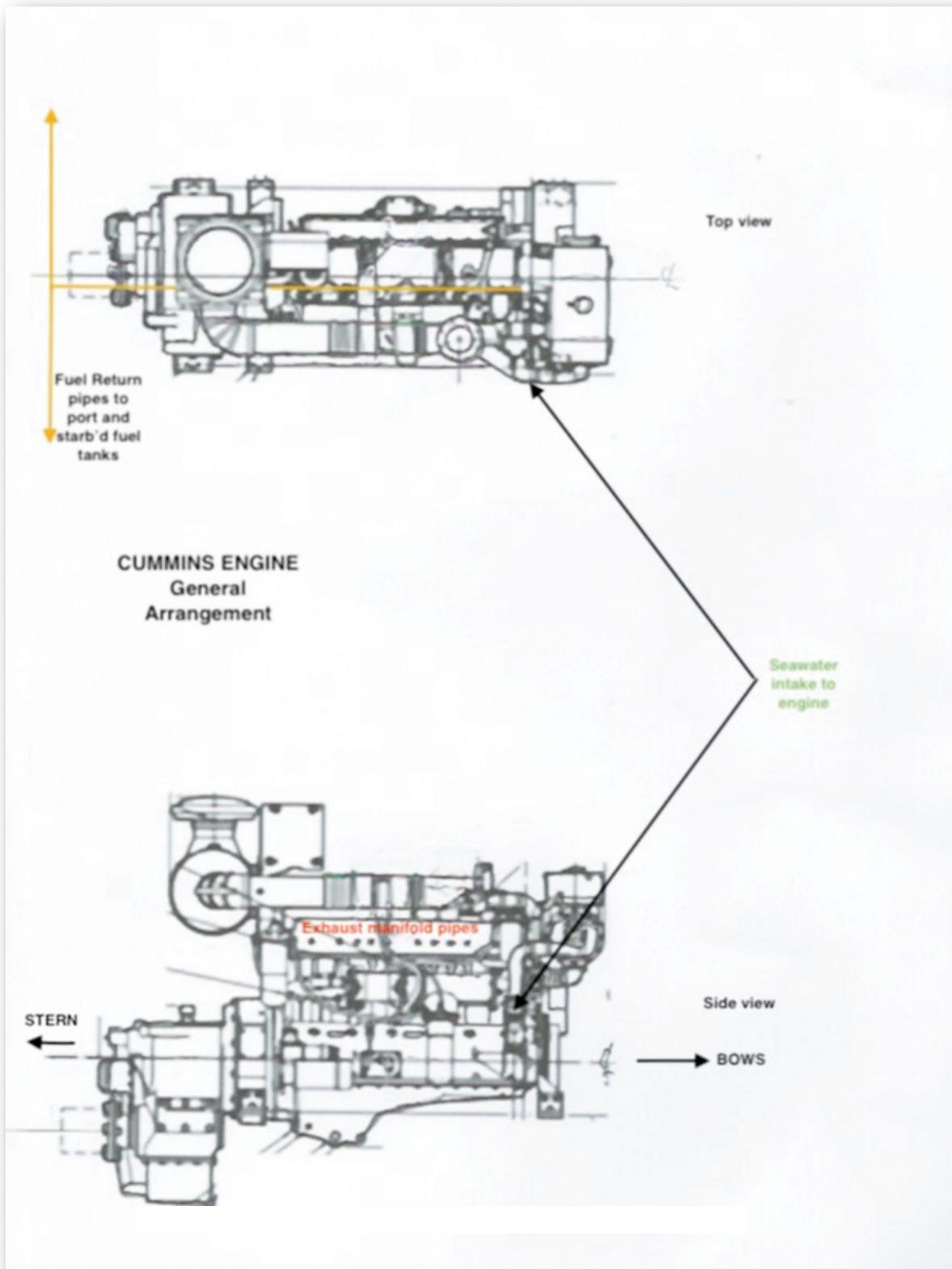


Fig.2: Cummins Engine - General Arrangement

Appendix 7.4 General Arrangements

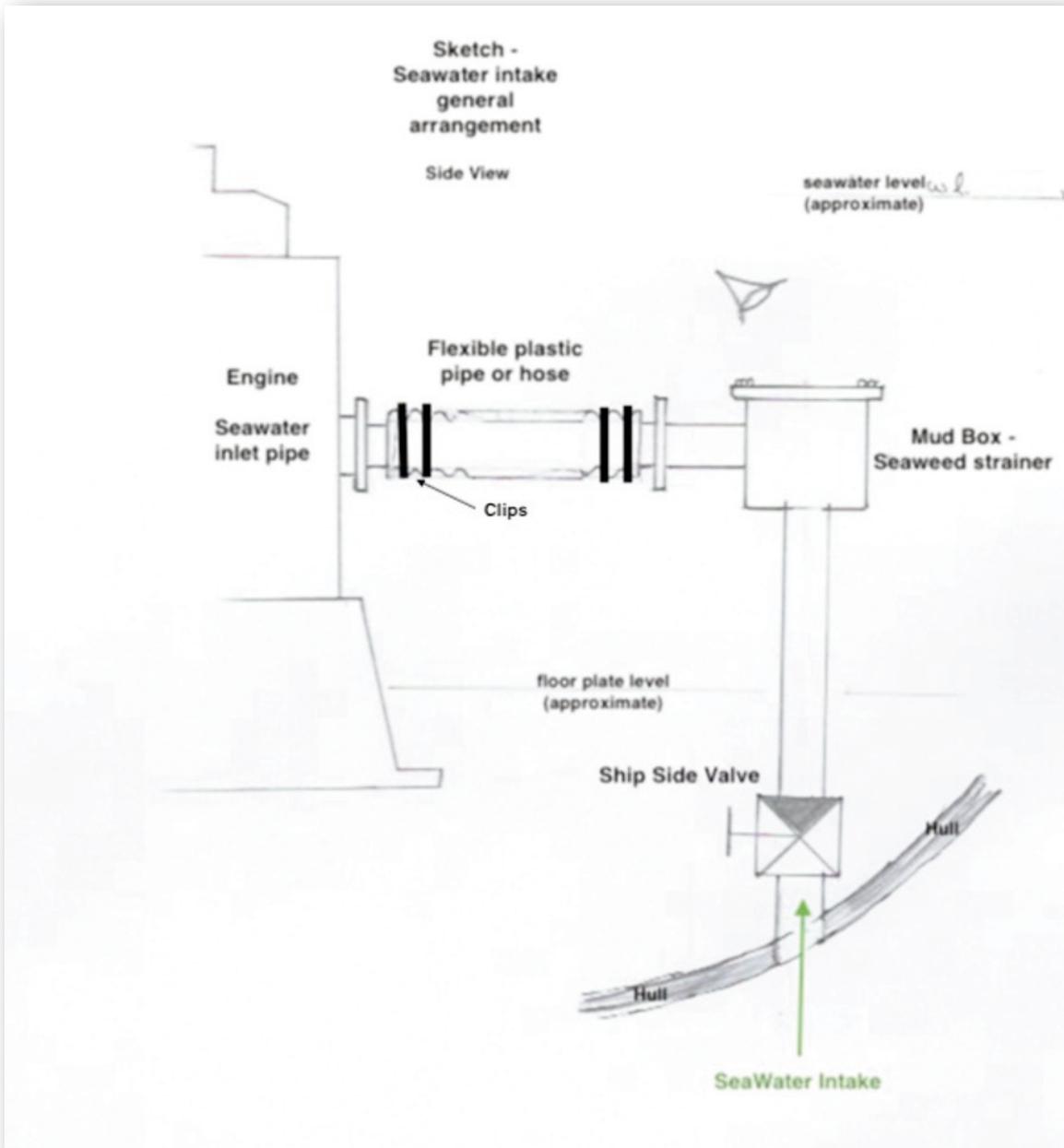


Fig.3- Sketch: Seawater Intake Pipe arrangement

Appendix 7.5 Documents and Diagrams



**Design, Construction, Equipment and Operation of
Small Fishing Vessels of less than 15 m Length overall**

Code of Practice

Declaration of Compliance

To be completed by an Authorised Person

Declarations on page v to be signed by the Authorised Person and Owner

Name of Vessel	Fishing Letters & Number	Official Number	Port of Registry
Kayleigh	S220	404502	Skibbereen
Overall Length (less than 15 metres)	Breadth	Depth	Date keel laid
13.26m	5.0m	2.31m	1987
Engine Make & Model			Engine Power (kW)
Cummins N855			145kW
Call Sign	Radio Operators Cert no.	No of Crew	BIM Card no.
EI-GF-2	LRC281	2	03-01234; 05-00054

Name, Address & Contact Number of Owner	
---	--

Description of vessel including type of fishing vessel is engaged in
Cygnus 44. GRP Decked vessel with forward wheelhouse. Net Hauler forward to starboard. Steel aft gantry with net drum and landing derrick. Winch on deck. Partial aluminium shelter.

Description of operational area
South and West Coasts within 15miles of shore.

- i -

Revision 2 20/01/14

Fig.1 - Declaration of Compliance - Vessel details

Appendix 7.5 Documents and Diagrams

Chapter 5 Fire Protection, Detection & Extinction

5.1	Fire Safety				
#5.1.1	Machinery space capable of being closed down?				Yes / No/NA
*5.1.2	Fire Prevention - comply?				Yes / No
*5.1.3	Cleanliness and Pollution Prevention - comply?				Yes / No
*5.1.4	Open-Flame Gas Appliances - comply?				Yes / No/NA
*5.1.5	Gas Detection - comply?				Yes / No/NA
5.2	Fire Fighting Appliances				
#5.2.1	Are extinguishers of an approved type				Yes /No-
#5.2.2	Portable Extinguishers	Engine room			Serviced Date 05/16
		Type	Foam	Rating 13A144B	N ^o 2
#5.2.5	Other spaces	Type Powder, CO2			Rating 3A70B:34B N ^o 1:1
		Fire buckets			N ^o 1
#5.2.6	Remote controls for fuel tank valves	Yes / No	Number	1	
			Location	Wheelhouse	
#5.2.6	Are means of closing skylights, doorways etc to machinery and cargo spaces adequate?				Yes / No/NA

Chapter 6 Protection of Crew

6.1	Protection of Personnel				
*6.1.2	Bulwarks, Guard Rails and Handrails - comply?				Yes / No-
*6.1.4	Surface of Working Decks - comply?				Yes / No
*6.1.5	Personal Protective Equipment - comply?				Yes / No
#6.2	Medical Stores - comply?				Yes / No
	Expiry date of medical stores				01/17
*6.3	Securing of Heavy Items of Equipment and Fishing Gear, etc. - comply?				Yes / No/NA

Chapter 7 Life-Saving Appliances

#7.1	Are all items of LSA of an approved type				Yes /No
#7.2	Have relevant items of LSA been serviced				Yes / No
#7.3	1 Lifejacket for every person on board		Yes / No	N ^o :	3
#7.4	Liferafts sufficient for 100% persons		Yes / No-	N ^o 1	Last Serviced 10/15
	Hydrostatic Release Unit (HRU)		Yes /No-	N ^o 1	Exp. Date 10/17
#7.5	Lifebuoys		Total N ^o of Lifebuoys		2
			N ^o with 18m line		1
			N ^o with combined light & smoke signal		1
#7.6	1 Personal Floatation Devices (PFD) for every person on board		Yes / No	N ^o :	3
#7.8	Distress signals	6 red star or allowed alternative	Yes / No	12 parachute rockets	Yes / No
#7.8	Flares Expiry date				07/17
*7.9	Means for Recovering Persons from the Water				Yes / No-

Chapter 8 Manning, Training & Certification

#8.2	Manning - comply?				Yes / No
*8.8	Standards of Competence - comply?				Yes / No-
*8.3	Operation and Maintenance of Propulsion Machinery - comply?				Yes /No
*8.4	Operation of Radio Equipment - comply?				Yes / No
#8.5	Safety Training - comply?				Yes / No
#8.6	Is there a copy of the Code of Practice on board?				Yes / No
#8.9	Musters and Drills – comply?				Yes /No/NA
#8.10	Organisation of Working Time – comply?				Yes / No

Fig.2 - Declaration of Compliance - Fire Protection, Detection and Extinction

Appendix 7.5 Documents and Diagrams

Notes:

1. # indicates Statutory requirements
2. * indicates mandatory requirement for Code compliance
3. ‡ indicates statutory requirement for vessels ≥ 12m L_{oa} and mandatory requirement for Code compliance for vessels < 12m L_{oa}
4. Only Statutory and mandatory Code requirements are to be addressed when completing the Declaration.
5. If 'No' is answered to any question, please supply, in a separate statement, the reasons why the particular item is not complied with.
6. If a particular item is not applicable, please state the reason why.

Declaration by Authorised Person

Name of Vessel	Fishing Letters & Number	Official Number	Port of Registry
Kayleigh	S220	404502	Skibbereen

I hereby declare that on 10/6/16 at Castletown I completed the survey of the Fishing Vessel ..
Kayleigh and that:

1. the particulars given on this form are true and correct;
2. in my judgement the vessel complies with the Code of Practice and is fit for its intended fishing method and for the sea areas in which it is intended to operate.

Dated at Castletown
 this 10th day of June 2016

Signed ..

This Declaration is valid until
9th day of June 2020

Company Stamp.

Declaration by Owner

I/We [Redacted]
 Owner(s) of the above-described vessel declare that the particulars given on this form are correct and that we have no reason to believe that vessel is not fit for its intended fishing method or for the sea areas in which it is intended to operate.

Signature(s):

If company, state position held:

Date 10-06-16

Fig.3 - Declaration of Compliance - Declaration

SECTION 36 PROCESS

Section 36 of the Merchant Shipping (Investigation of Marine Casualties) Act, 2000

It is a requirement under Section 36 that:

- (1) Before publishing a report, the Board shall send a draft of the report or sections of the draft report to any person who, in its opinion, is likely to be adversely affected by the publishing of the report or sections or, if that person be deceased, then such person as appears to the Board best to represent that person's interest.
- (2) A person to whom the Board sends a draft in accordance with subsection (1) may, within a period of 28 days commencing on the date on which the draft is sent to the person, or such further period not exceeding 28 days, as the Board in its absolute discretion thinks fit, submit to the Board in writing his or her observations on the draft.
- (3) A person to whom a draft has been sent in accordance with subsection (1) may apply to the Board for an extension, in accordance with subsection (2), of the period in which to submit his or her observations on the draft.
- (4) Observations submitted to the Board in accordance with subsection (2) shall be included in an appendix to the published report, unless the person submitting the observations requests in writing that the observations be not published.
- (5) Where observations are submitted to the Board in accordance with subsection (2), the Board may, at its discretion -
 - (a) alter the draft before publication or decide not to do so, or
 - (b) include in the published report such comments on the observations as it thinks fit.'

The Board reviews and considers all observations received whether published or not published in the final report. When the Board considers an observation requires amendments to the report that is stated beside the relevant observation. When the Board is satisfied that the report has adequately addressed the issue in the observation, then the observation is 'Noted' without comment or amendment. The Board may make further amendments or observations in light of the responses under Section 36. 'Noted' does not mean that the Board either agrees or disagrees with the observation.

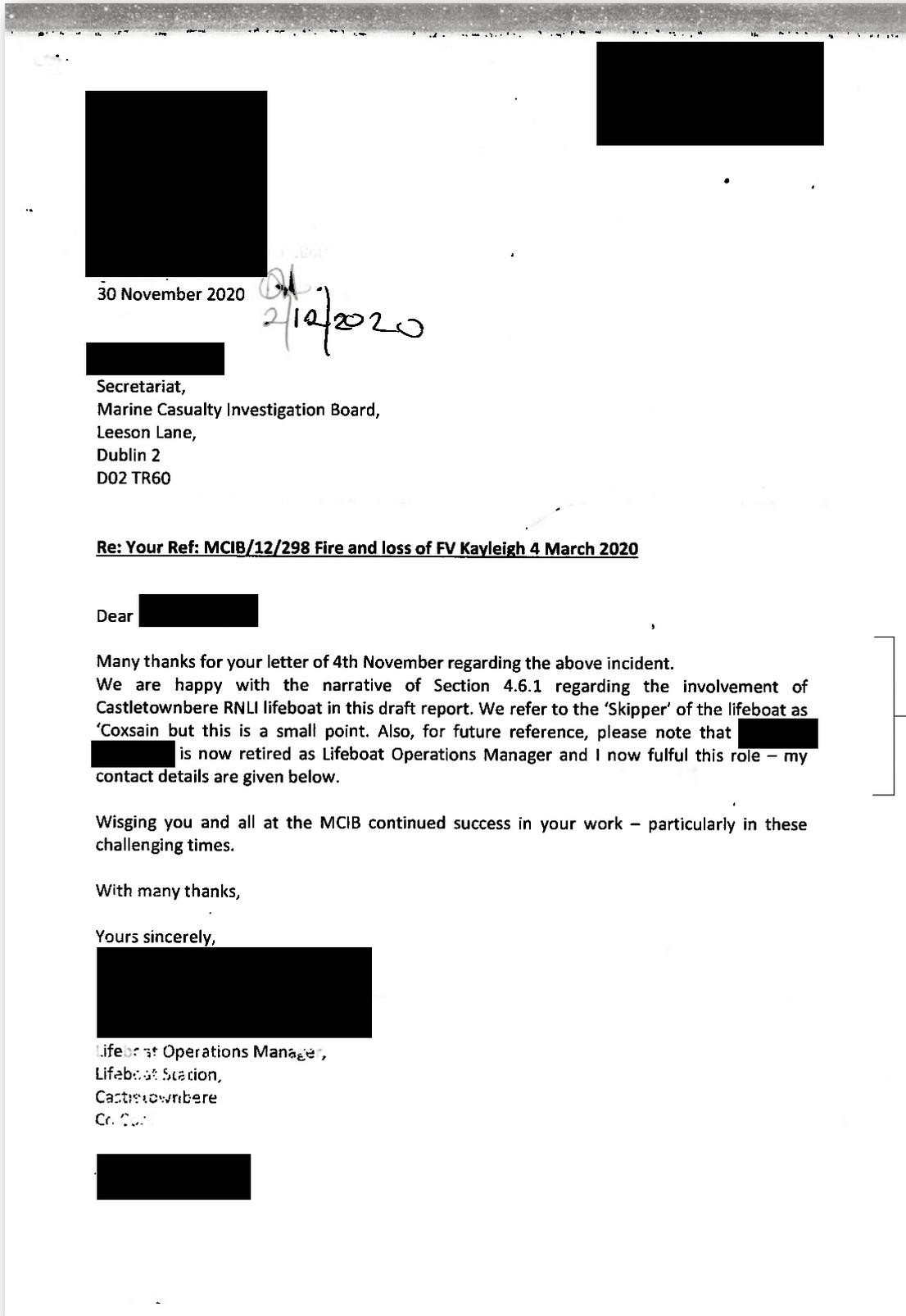
Response(s) received following circulation of the draft report are included in the following section.

8. SECTION 36 - CORRESPONDENCE RECEIVED

	PAGE
8.1 Lifeboat Operations Manager and MCIB response	45

Note: The names and contact details of the individual respondents have been obscured for privacy reasons.

Correspondence 8.1 Lifeboat Operations Manager and MCIB response



MCIB RESPONSE:
Noted and the
report has been
amended.



Leeson Lane, Dublin 2.
Telephone: 01-678 3485/86.
email: info@mcib.ie
www.mcib.ie

