



Australian Government

Australian Transport Safety Bureau

Suspected engine room fire and passenger evacuation on board *Fitzroy Flyer*

7 NM east-north-east of Cairns, Queensland, on 29 March 2019

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Marine Occurrence Investigation
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Addendum

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Safety summary

What happened

On 29 March 2019, the catamaran ferry *Fitzroy Flyer* was on a scheduled trip between Cairns and Fitzroy Island, Queensland, with four crewmembers and 37 passengers on board. At about 1410, the port main engine overheated, and shortly after, a fire alarm activated in the port engine room. A crewmember and passenger investigated and reported smoke and fire. Initial attempts were made to extinguish the fire using portable extinguishers, but the success of these actions could not be confirmed. At about 1450, the master activated the port engine room fire suppression system.

All passengers were mustered and evacuated to two nearby vessels. At 1615 the master started the starboard engine and *Fitzroy Flyer* returned to Cairns at slow speed. By 1710, the ferry had been safely berthed without further incident.

What the ATSB found

No evidence of a fire or any fire damage was found in the engine room during inspections carried out after the incident. The signs seen by personnel were likely from smoke due to a loose and slipping fan drive belt and steam from the overheated cooling system.

The ATSB found that the on-board response did not follow company procedures as had been practised by crewmembers during emergency drills. More specifically:

- the crew did not promptly deploy the vessel's fire suppression system or apply boundary cooling to the area
- multiple entries were made into the contaminated port main engine room without suitable control measures in place
- passengers were transferred to other vessels while in open waters and without lifejackets (the engine room situation appeared to be under control at the time and the transfer unnecessarily exposed the passengers to increased risk)
- an urgency message, informing and requesting assistance, was not sent.

What has been done as a result

Fitzroy Island Investments (*Fitzroy Flyer's* owner-operator) reported that it has conducted a comprehensive evaluation and updating of the safety management system with emphasis on emergency procedures and drills. Schedules of regular shipboard staff training in procedures use and implementation, along with more frequent and targeted fire training and drills, have been implemented. In addition, a closed-circuit television camera surveillance system, with extended recording capability, has been fitted throughout the vessel.

Safety message

This occurrence highlights the importance of vessel operators having robust procedures and training for responding to fires and other emergencies on board, and for crewmembers to follow procedures and training in such situations. In particular, if a fire is suspected in an engine room, and further assessment is not possible, then crews should deploy the available suppression systems and transmit an urgency message.

The investigation

The occurrence

Departure from Cairns

Each day, the catamaran ferry *Fitzroy Flyer* (Figure 1) operated three return transfers between Cairns and Fitzroy Island, Queensland, with each leg taking about 50 minutes.

At about 0700 Eastern Standard Time¹ on 29 March 2019, the master boarded the vessel to conduct pre-start up routines. Shortly after, three crewmembers boarded and prepared the passenger cabin for the daily operations. The first transfer of the day departed Cairns at 0800 and, at 1350, *Fitzroy Flyer* departed Cairns on its third transfer with 37 passengers on board.

Figure 1: *Fitzroy Flyer*



Source: www.fitzroyisland.com

Immediate response to detection of fire

At about 1410, about halfway to Fitzroy Island (Figure 2), the master noticed that the port main engine cooling water temperature reading was high and he reduced both engines to neutral. A crewmember, deckhand 1 (DH1), in the main cabin, noticed the reduction in speed and went aft to investigate. Shortly after, a fire alarm activated on the bridge console for the port engine room. Not all crewmembers carried radios and the master radioed the galley and instructed a crewmember to investigate. DH1 acknowledged and proceeded to the port engine room.

A passenger, who was a staff member on Fitzroy Island, overheard that a fire alarm had been activated and went to assist. He informed DH1 that he was a former firefighter and DH1 accepted his offer of assistance.

¹ Eastern Standard Time (EST), Coordinated Universal Time (UTC) + 10 hours.

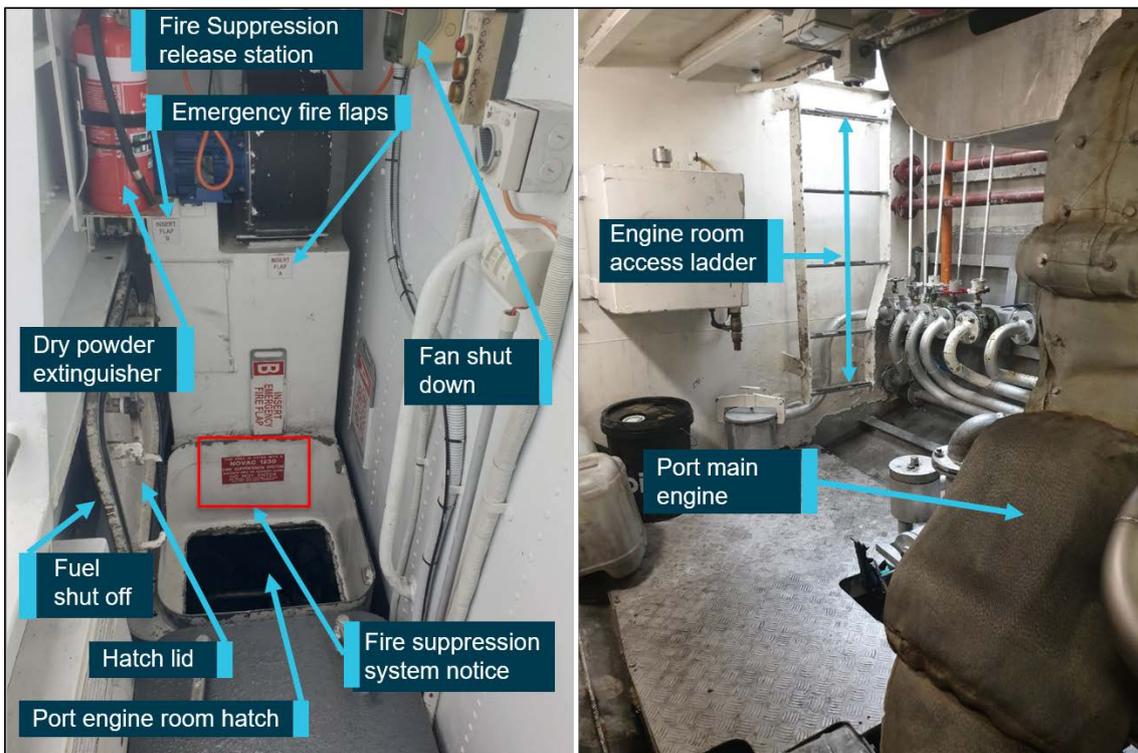
Figure 2: Position of *Fitzroy Flyer* in Mission Bay when the fire alarm activated



Source: Google Earth, annotated by ATSB

As DH1 and the passenger approached the engine room hatch lid, they could feel heat coming from it (Figure 3). As a precaution before opening the hatch lid, the passenger had collected a portable carbon dioxide (CO₂) fire extinguisher. When the hatch lid was opened, they sighted light-coloured smoke. They then climbed down the ladder, which was ‘hot to touch’, into the engine room to investigate further. They saw smoke, tinged blue, near the fuel filters,² and the passenger released the CO₂ extinguisher. They both then left the engine room and closed the lid.

Figure 3: Port engine room and entrance



Source: Fitzroy Investments, annotated by ATSB

² The passenger stated that, in their many years' experience as a fire fighter, the blue tinged smoke indicated a fire.

Subsequent response actions

At about 1415, DH1 reported to the master that there was a fire in the port engine room. The ferry slowed to a stop and the master shut down the port main engine. He asked another crewmember, deckhand 2 (DH2), to remain in the wheelhouse while he went to investigate.

Shortly after, at about 1420, DH1 and the passenger met the master by the port engine room. DH1 advised there was a smell of electrical burning and smoke with a blue tinge was coming from near the fuel filters. They confirmed to the master that they believed there was a fire and that a CO₂ extinguisher had been released into the space. The master stated that, as CO₂ had just been released, he could not make an entry for several minutes, so he returned to the wheelhouse. Once there, he instructed DH2 to move the passengers to the muster stations at the bow of the vessel and then he tried to call the shore management company via mobile phone. No other external communications, such as an urgency message (PAN PAN), were made at this time. The third crewmember, deckhand 3 (DH3), assisted DH2.

At about 1425, the master radioed for DH1 to come to the wheelhouse and keep lookout. After DH1 arrived, the master went back down to the engine room entrance, where the passenger met him. The master then isolated the fuel and emergency fire flaps for the engine room.

At about 1435, the master opened the engine room hatch lid and went into the engine room—he held his breath, due to the earlier release of the CO₂ extinguisher. He did not see any signs of ‘flames or fire’ but could feel heat in the space and saw either ‘smoke or steam’. He released a dry powder extinguisher into the engine room and closed the hatch lid on exit.

At about 1440, the master returned to the wheelhouse and contacted the Cairns Vessel Traffic Services (VTS) to advise of the situation. Shortly after, the master saw a passing vessel, *Scuba Pro*, and contacted the crew for assistance, telling them they may need to evacuate passengers from *Fitzroy Flyer*. *Scuba Pro*'s skipper advised they could take 13 passengers. The master told DH2 to find 13 volunteers to evacuate. DH2 made an announcement to the passengers about the situation.

By 1445, the master had established contact with shore management and advised them of the situation and that he had not activated the port main engine fire suppression system. The master was instructed to activate the suppression system and was informed that management would come out to the vessel to assist with logistics.

By 1450, on the master's orders, DH1 had activated the port main engine fire suppression system. The master then contacted VTS to advise that 13 passengers would be evacuated to *Scuba Pro* and the fire suppression system had been activated.

Passenger evacuation

At 1500, *Scuba Pro* was alongside *Fitzroy Flyer* and passenger transfer started. This was not a straightforward process as there was a freeboard difference, requiring a large step down to the other vessel. Also, several passengers had reduced mobility and others had expressed reluctance to transfer to the other vessels in open waters. In addition, the passengers did not wear flotation devices (lifejackets) during the transfer.

By 1510, the master contacted another vessel, *Millennium Spirit*, and asked if they could accommodate the remaining 24 passengers.

At about 1520, *Scuba Pro* pulled away from *Fitzroy Flyer* and the master reported to VTS they had taken 13 passengers and that *Millennium Spirit* would take those remaining. *Millennium Spirit* was alongside *Fitzroy Flyer* at about 1530 and passenger evacuation started.

Shortly after, at about 1540, the shore management vessel came alongside *Fitzroy Flyer* and the marine operations manager (MOP) and designated person ashore (DPA) boarded. The MOP went to the upper deck and started off-loading baggage, while the DPA went to the port engine

room. Once at the engine room hatch, he opened the hatch lid and went inside to inspect; DH1 maintained watch at the top of the ladder.

Return to Cairns

At 1600, the master radioed VTS and reported that all remaining passengers had been safely offloaded to *Millennium Spirit*, and *Fitzroy Flyer* was making way to Cairns on the starboard engine. At about 1710, *Fitzroy Flyer* was safely alongside in Cairns.

Shortly after, the engine room was ventilated and inspected. The engine was found to be low on coolant and the water pump drive belt showed signs of burning due to a loss of tension.

There were no signs of fire anywhere in the engine room.

Context

Vessel information

Fitzroy Flyer is a catamaran ferry built in 1988. It is 22 m long with 8.7 m beam and draught of 2.69 m and was owned by Fitzroy Island Investments Pty Ltd at the time of the incident. The ferry is a Class 1 (13 or more passengers) registered Australian domestic commercial vessel for operational areas C (restricted offshore, to 30 NM) and D (partially smooth waters). It was certified to carry 186 passengers and four crewmembers in sheltered waters.

The vessel has a service speed of 23 knots and is powered by two MTU 12V 183 TE72, 495 kW main engines, one in each hull. Electrical power is supplied by a single 75 kW Isuzu BB-4BG1TRD-01 four-cylinder turbocharged diesel engine, located in the generator room in the port hull.

The port and starboard engine rooms are each protected by a Novec 1230³ fixed fire-suppression system. The systems were designed to flood the space and extinguish a fire by rapidly removing heat. The engine room needed to be isolated and secured, the system activated and then the space and conditions monitored.

Safety induction, training and emergency drills

The company's safety management system (SMS) documented guidance for crewmember induction, training and emergency plans and drills. The designated person ashore (DPA) and the master were to check the effectiveness of the training. The master was responsible for conducting on-board training and emergency scenario drills.

All crewmembers had to complete a vessel safety induction before they commenced work on board. Training and competency were required in vessel safe operation, emergency equipment, the vessel layout/safety and administration. This included familiarisation with emergency procedures and duties, the engine room fire suppression systems, firefighting appliances, entry into void spaces/engine room, crew-only areas and the procedural manuals.

The emergency plans detailed the preparation, training and emergency procedures that the crewmembers should know. Specifically for a fire emergency, the crewmembers needed to know, amongst other things:

- the muster stations for their shift
- the location and use of firefighting equipment
- the location of fuel and fan shut-offs and how to use the emergency fire flaps

³ Novec 1230 is a proprietary (3M) clean agent fire-extinguishing medium. It belongs to the family of chemicals called halocarbons and was developed as a halon replacement and hydrofluorocarbon (HFC) alternative. According to its manufacturer, Novec 1230 fluid has the highest margin of safety for human occupancy among clean agents, including inert gas. Source: www.3m.com.

- correct emergency signals and to maintain proper and effective communication.

The SMS required that on-board emergency drills be conducted on a regular basis. The crewmembers practised the emergency procedures for seven different scenarios, including fire and ‘abandon ship’. The drill records showed that the crewmembers on board at the time of the incident had each completed one fire drill in the previous 4 months, and all but DH2 had completed an ‘abandon ship’ drill in the previous 4 months.

Emergency procedures

The procedures detailed the individual crewmembers’ duties in case of a fire emergency. For example, the master was to attend the wheelhouse, maintain radio communications and direct crewmembers. This was supported by a specific fire emergency checklist on board that detailed the actions to be taken in the event of a fire. This checklist included:

- sound fire alarm—muster and account for all persons on board
- identify and assess the type of fire and its location
- shut all ventilation to affected areas and fight the fire if safe to do so
- prepare lifesaving equipment and portable flotation devices
- broadcast an urgency message to request assistance.

In addition to this were instructions for operating the main engine room fixed fire-suppression systems: secure the engine room access hatch, isolate the space and then activate the suppression system. The hatch lid was to remain closed for a sufficient period before entry was made. A warning sign on the hatch lid stated that the space should not be entered until it had been thoroughly ventilated.

Risk management

The SMS contained a register of 57 risk assessments for activities and operations involving the vessel. In particular, one risk assessment dealt with a ‘Fire on vessel’ (including engine room fire) and two others detailed controls for engine room and confined space entry.

The risk control measures required that only trained crew may access confined spaces, that the atmosphere should be tested, and that personal protective equipment and breathing apparatus should be worn. However, the vessel did not carry either self-contained breathing apparatus or suitable atmosphere testing equipment, nor was it required to do so. Further, the procedures required the master to be advised which crewmembers were entering the engine room.

Vessel management

The company designated person ashore (DPA) was responsible for monitoring the safe operation of the vessel. The DPA had direct access to the owner of the vessel and had duties which included monitoring the SMS and the on-board training.

The vessel’s master had complete authority on board and was responsible for taking all necessary actions in the interest of safety. The master could deviate from the documented procedures if human life was at risk, and could ask the company for help when deemed necessary.

Safety analysis

Source of smoke

During the leg from Cairns to Fitzroy Island, a fire alarm activated in the port engine room. After inspecting the room, the crew believed there was a fire on board and subsequently the passengers were evacuated. However, no evidence of a fire or any fire damage was found in the engine room during inspections carried out after the incident. The signs seen by personnel were likely from smoke due to a loose and slipping fan drive belt and steam from the overheated cooling system.

The remainder of this analysis will examine the procedures and actions regarding the response to the suspected fire.

Immediate response actions

All crewmembers on board the vessel had completed the mandatory safety induction and participated in emergency drills. The vessel's masters had conducted emergency scenario training for on-board fires six times in the 4 months before the incident. The training involved using fire hoses, extinguishers, boundary cooling and activating the fire suppression system. The master and deckhand 1 (DH1) were familiar with the emergency procedures and had been involved in three and four drills respectively. With potentially 190 persons on board the vessel, any response to an emergency needed to be effective.

However, in this case the crew suspected there was a fire in the port engine room but did not follow their training and procedures. In particular, they did not promptly lock down the engine room, deploy the fire suppression system and apply boundary cooling to the area.

Prior to flooding the engine room with the fixed fire suppression agent, the master attempted to determine whether a fire was actually present. His assessment of the situation included obtaining advice from DH1 and the passenger, along with a personal inspection of the port engine room. He was unable to confirm that there was a fire and remained hopeful that the situation could be contained without the need to release the fire suppression system. However, after seeking shore management advice, the system was activated, about 30 minutes after DH1 first advised that there was a fire present.

When doubt exists and it is unsafe to confirm whether a fire is present, prudent action would be to use the systems in place early in the response to contain and limit escalation of the situation.

In addition, a number of other aspects of the emergency response were problematic, including the involvement of a passenger, uncontrolled entries into a dangerous space and limited communications.

Passenger involvement

A passenger on board *Fitzroy Flyer* offered assistance and became actively involved in the incident response, including making an entry into the engine room. The passenger reported seeing blue colouration and smoke, and released a CO₂ extinguisher into the space. The passenger believed that the blue-coloured smoke indicated there was a fire present. His experience and observations, when relayed to the master, likely influenced the master's decisions and the incident response.

However, only trained crewmembers were assigned emergency duties on board the vessel, and the passenger was not trained in the use of the vessel's equipment or procedures. The emergency procedures and risk assessments did not refer to the involvement of any other persons, regardless of their (unverified) experience or willingness to assist. Although using other available resources during emergencies can be a useful strategy if insufficient resources are available or the situation is unusual and complex, in this case the situation should have been well within the capabilities of the crew on board to manage.

Entry into dangerous spaces

Risk controls were in place to protect crewmembers entering into dangerous spaces. However, the vessel did not carry the necessary equipment to allow entry as per the procedures. Consequently, several entries were made into the contaminated engine room without these precautions being followed. More specifically, the passenger and DH1 were in the engine room when the CO₂ extinguisher was released, the master entered not long after the CO₂ extinguisher was released (without any ventilation being applied), and the designated person ashore (DPA) entered about 50 minutes after the fire suppression system had been deployed (without any ventilation being applied).

As there was, as a minimum, smoke, and there had been a suspected fire as well as the release of firefighting media into the engine room, the atmosphere was contaminated. Therefore, entry into the space should have been carefully controlled with consideration given to the conditions existing and the extent to which these risk controls could have been in place before any entry.

Evacuation of passengers

During the incident, the master directed the passengers to muster and then decided to evacuate them to passing vessels. Due to the difficulties in transferring persons of varying capability between moving vessels in a seaway, and without lifejackets, the transfer of passengers off *Fitzroy Flyer* was problematic. The transfers did not follow the vessel's evacuation procedure.

Furthermore, at this stage, the engine room situation appeared to be contained and the need to evacuate was not clearly apparent. With one operational engine, *Fitzroy Flyer* could have made its way to Fitzroy Island or Cairns. The passengers would not, then, have been exposed to further risk during the transfer. In such circumstances, it would have been prudent to keep the passengers on board *Fitzroy Flyer*, as the vessel was in fact the best lifeboat at the time. As a precaution, the other vessels could have remained close by for immediate access if the situation deteriorated or until they were no longer needed.

Internal and external communications

Fitzroy Flyer did not carry sufficient radios for the four crewmembers. This resulted in some of the crewmembers' conversations having to be communicated face-to-face during the emergency and the passenger evacuation. Therefore not all of the crew were kept aware of the full situation.

Further, the emergency procedures required an urgency message to be broadcast to request assistance. Despite the initial reports of smoke and then the decision to evacuate the passengers, a message was not broadcast.

As with any emergency situation, communications are key, and early notice to nearby vessels and authorities is advised. These parties are then in a position to prepare and provide timely assistance, regardless of whether the situation escalates or not.

Findings

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

- Although the crew believed that there was a fire in the port engine room, no evidence of a fire was subsequently found.
- Although the crew had received regular emergency response training for a fire, they did not follow some key elements of this training during the response to the suspected fire. In particular, the crew did not promptly deploy the engine room fire suppression system and apply boundary cooling to the area.
- A passenger (a former firefighter) actively sought involvement in the response to the fire alarm. His actions and advice likely influenced the master's decision making.
- Several people made entries into the port engine room, even though it had not been adequately ventilated or the atmosphere tested.
- Passengers were unnecessarily exposed to increased risk when they were evacuated, without lifejackets, to two vessels with varying freeboards, in open waters.
- Communications throughout the incident were limited. On board there was not a sufficient quantity of UHF radios for all crewmembers and, externally, an urgency message was not broadcast.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Fitzroy Island Investments Pty Ltd (vessel manager)

As a result of this incident, Fitzroy Island Investments advised the ATSB that the following safety actions have been taken:

- conducted a comprehensive assessment and update of the safety management system emergency procedures and drills documentation and procedures
- introduced a system of regular (at least monthly) on-site training for masters and crew in the implementation of procedures
- purchased additional radios and implemented procedures for radio use (including all crewmembers being required to carry a radio at all times while on board)
- installed an eight zone closed-circuit television cameras (CCTV) system (with 1 month recording capability) throughout the vessel, covering engine rooms, wheelhouse, passenger areas and main muster points
- clarified procedures to ensure all crewmembers are aware that passengers must not be involved in firefighting operations, even if they claim to be experienced
- implemented a schedule for more frequent and specific fire training and drills.

General details

Occurrence details

Date and time:	29 March 2019 – 1410 EST	
Occurrence category:	Incident	
Primary occurrence type:	Suspected fire and passenger evacuation	
Location:	7 NM east-north-east of Cairns, Queensland	
	Latitude: 16° 51.762' S	Latitude: 145° 52.827' E

Vessel details

Name:	<i>Fitzroy Flyer</i>	
Identifier:	3504QC	
Flag:	Australian	
Type of operation:	Domestic commercial vessel, Class 1, Operational areas C and D	
Departure:	Cairns	
Destination:	Fitzroy Island	
Injuries:	Crew – nil	Passengers – nil
Damage:	None	

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within ATSB's jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to operations involving the travelling public.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.