

**REPORT NO: 03 3093 VESSEL NAME: HARBOUR CAT**

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**KEY EVENTS**

- 1.1 On 16 January 2003, at approximately 1705 hours New Zealand Daylight Time (NZDT), the crew of **Harbour Cat** boarded at Pier 4 at the Auckland Ferry Basin and manoeuvred the vessel to Pier 1A for the scheduled 1720 hours departure to Northcote Point and Birkenhead Wharves.
- 1.2 After departing from Auckland and dropping off passengers at Northcote and Birkenhead, **Harbour Cat** left Birkenhead with two passengers on board, for the Auckland ferry basin.
- 1.3 At 1743 hours, approximately 400 metres north of Wynyard wharf, the fire alarm sounded in the wheelhouse. The Master observed excessive smoke from the starboard funnel and immediately stopped the starboard engine and brought the port engine back to idle ahead. He instructed the first deckhand to steer towards the ferry basin and to contact the Company operations centre on VHF radio and advise of the situation.
- 1.4 Company personnel immediately departed the ferry basin on **Quickcat II** to assist **Harbour Cat**.
- 1.5 The Master proceeded below with the second crewman to fight the fire. The air vent for the starboard engine bay was closed. Both starboard hatches were opened and flames were observed down the aft hatch at the turbo charger and exhaust area of the engine. The Master closed the hatches and instructed the second crewmember to get two Aqueous Film Forming Foam (AFFF) extinguishers from the aft cabin.
- 1.6 The Master reopened both hatches and, after deploying both extinguishers down the hatches, he extinguished the fire.
- 1.7 After determining it was safe, the Master entered the engine room to look for hot spots. None were detected.
- 1.8 The Master instructed the second crewman to monitor the engine room for re-ignition and returned to the bridge to take over the helm. He increased revolutions on the port engine and proceeded to the Auckland Ferry basin.
- 1.9 Shortly after, the second crewman deployed the remainder of the second AFFF extinguisher into the forward hatch after flames re-ignited in the insulation material.



- 1.10** When the first crewmember arrived at the engine room hatch after being relieved at the helm, she directed more AFFF into the aft hatch that was continuing to emit a large quantity of smoke. She observed the second crewman was becoming overcome by smoke and told him to go out on to the aft deck.
- 1.11** As *Harbour Cat* approached the basin, the Master radioed *Quickcat II* advising her to stand down as *Harbour Cat* was able to berth under her own power and there was no immediate danger to passengers or crew. *Harbour Cat* then berthed at berth 2E in the ferry basin and the passengers were taken off the vessel.
- 1.12** Shore based Company personnel then deployed additional foam and dry powder extinguishers into the engine room.

## **KEY CONDITIONS**

- 2.1** *Harbour Cat* is a 17.44 metre aluminium Catamaran owned by Fullers Group Ltd (the Company). The vessel holds a current Inshore Safe Ship Management (SSM) Certificate issued on 16 August 2002 and valid until 30 November 2005. On 4 November 2002, a Minimum Safe Crewing document (MSC) was issued by the Maritime Safety Authority (MSA). Maritime Rule 31B.8(2) states that the owner and Master must take into account the requirement of training seafarers when applying and setting the levels of manning under the MSC document. When in enclosed waters, with less than 100 passengers, the MSC requires only a Master to ILM certification and one other crew.
- 2.2** *Harbour Cat* is powered by two six cylinder Scania DS1-1 I-74 series 300 kW engines. The vessel was purchased approximately 18 months previously. A broken fuel line for the same injector line had caused a fire on the vessel on 11 May 2002.
- 2.3** *Harbour Cat* had eight CO2 dry powder and AFFF extinguishers on board. Additional fire fighting equipment on board included a fire hose, buckets and a fire blanket. Both engine bays had a fixed FM 200 flood fire fighting system that had been installed after the previous fire. The flood system was activated by obtaining a key from the galley to open padlocks to access the release valves. The Master considered deploying the fixed fire fighting system but when he saw the size of the fire he thought the fire could be contained with fire extinguishers alone.
- 2.4** The Master holds a New Zealand Coastal Masters (NZCM) Certificate of Competency, issued on 20 September 1999. He was a volunteer fireman and, in addition to the fire fighting training obtained for his Certificate, he received fire-fighting training whilst in the New Zealand Navy. He has extensive commercial experience and had worked for the Company for three and a half years. He was rostered on board *Harbour Cat* for three to five days every five weeks. He had previous experience in fire fighting at sea. He had been given no fire fighting training during his time with the Company but, as Master of various vessels, briefed his crew on fire fighting procedures periodically and had last done so on Harbour Cat some weeks before the fire. He had completed a 'Master's Requirements Vessel Procedures Form' on which he was assessed as being competent to operate the vessel.
- 2.5** The crewman who assisted the Master to fight the fire had no marine qualifications or fire fighting training apart from three fire drills with the Company in the 18 months he had been in service with them. On the larger Company vessels he had participated in SSM training that included a fire drill. This covered scenarios involving the use of breathing apparatus equipment. He was aware of the FM 200 system on board and the procedures on its use. This awareness was due to a previous fire drill that was held by the Master. This drill included the operation of fire extinguishers and the fire hose. It is a requirement of Maritime Rule 23.27(5)(a)(ii) that enclosed water limit passenger vessels undertake training in the use of fire fighting appliances.

- 2.6** The crewman who took over the helm from the Master holds an Inshore Launch Master (ILM) Certificate of Competency issued on 7 October 2002. She had been with the Company for 23 months. The fire training she had received from the Company was restricted to instructions from masters who were primarily engaged on larger Company vessels. She was aware of the FM 200 system and the procedures on its use from a previous fire drill held by the Master. She believed the FM 200 system would have been activated had there been a larger number of passengers on board.
- 2.7** It was standard procedure for relieving Masters to carry out their own engine room check on assuming command. Due, however, to the short handover time, the time restraints of the vessel's schedule and the fact that she was running behind schedule, the Master of Harbour Cat had no time to do this. The Master stated only limited checks of the engine room were carried out on *Harbour Cat* due to the difficulty of access caused by flush hatches. In addition, checks were not made when the engines were running due to the noise generated to the passenger area after the access hatches were opened to gain entry.
- 2.9** As the fire was being fought, there was a considerable amount of smoke and heat emission from the engine room. This necessitated the use of napkins over the mouths of the crew. After Harbour Cat berthed both crew were taken to hospital for smoke inhalation treatment. The smoke observed by the Master coming from the engine room was coloured dark grey.
- 2.10** Damage to the engine room was considerable. Combusted material included the rubber section of the air filter; lagging on the deck head of the engine room; hatches and exhaust systems; the engine loom from the engine to the junction box; cable controls and engine hoses.
- 2.11** The break in the No. 6 injection line was close to the delivery nut on the sealing nipple. This part of the line is not double jacketed. The No. 6 injector line is close to the turbo charger and the exhaust pipe.
- 2.12** This fire and the previous fire in May 2002, were caused by a fracture in the No. 6 injection fuel line at a point close to the injector. After the fire in May 2002, in addition to the flood systems being installed, the fuel line system was replaced with jacketed lines. Further, an alarm system to the bridge was installed to advise the Master of a fuel line fracture. This was activated by spilled fuel running down the outer jacket of the fuel line and filling up a tank that had a float switch alarm on it. This alarm did not sound because the point at which the fracture occurred was not double jacketed.

- 2.13** After the fire in 2002, new fire insulation was installed in both engine rooms and a fire alarm system installed. New lagging was installed on the exhaust system past the bellows and expansion joints and turbo outlet and the expansion joint aft of the turbo charger. Both engine room bays had air vent cut off flaps that were operated from the lower deck.
- 2.14** After this fire, Company engineers removed the fuel pump and the injectors and tested the engine cylinder to determine if it was over fuelling and causing a 'hammering' effect in the fuel pipe. The results were found to be in accordance with manufacturers specifications. Local agents for Scania have contacted the Swedish Manufacturers for input as to the reason for the failure of the fuel lines but had no response had been received at the time this report was compiled. The Company has taken steps to prevent a repetition of this incident by improving clamping arrangements on the fuel lines. It has also installed a deflection shield across the top of the injection lines to minimise diesel from spraying from any lines that may break and reaching hot areas in the engine room and igniting.
- 2.15** There is no forced air in the engine room and there is a dry exhaust both of which combine to create high heat levels within the engine rooms during operation.
- 2.16** The Company has improved considerably the safety standards on *Harbour Cat* since purchase.
- 2.17** *Harbour Cat* has a fire-fighting plan in the SSM manual. The Master was familiar with the procedure. In addition the Company has a contingency plan for onshore procedures in the case of a ship emergency.
- 2.18** The Company Operations Manager stated the Company runs regular in house safety drills including fire fighting. All new employees, within the first five training shifts, are required to have signed off a training form that includes fire fighting. Once this training is completed the crew are assigned to a core crew where the master oversees training.
- 2.19** The Master commented that in past, a reasonable amount of time was available for in house training. He stated however that there had been a "dramatic and possibly alarming decline in the amount of time allocated to crew training and also 'SSM checks' due to, I believe, the amount of services that are now being provided". He considered that given the lack of training (fire fighting) and extreme inexperience of his crew they performed well in responding to the fire. He also expressed concern that signing off requirements for training, that includes fire-fighting, that was once done over a five day period had since been reduced in some cases to one day and even hours. He further stated that management placed pressure on Masters to sign individuals off. The Master commented that almost all training was not scheduled and was carried on staff initiative when time was available. This training was logged as part of the SSM system and that flowing from this, management should be aware of the current level of training.

- 2.20** The Company commented the amount of SSM time rostered over the previous summer had declined, however, following the end of summer and America's Cup more time had been allocated to allow Masters to spend training time with crew if any extra time was required. In addition, all onboard services crew (cafe hands) spend at least three months on the large Company vessels where crew are given a good overall grounding in seamanship. ILM does not have a fire fighting requirement at present. To do so would require a change in the Rule and this would have to meet the "cost benefit" criteria.
- 2.21** All crew on *Harbour Cat* indicated to the Investigator, that they would benefit by attending a recognised fire-fighting course. They also considered that less time was allocated to crew training and SSM checks than had been in the past due to new scheduling pressures.
- 2.22** The Company had in the past sent staff on fire fighting courses at the Devonport naval base but was no longer doing so. Subject to resourcing and naval priorities the facility remains available to outside organisations.
- 2.23** The crewman who assisted the Master in fighting the fire was severely affected by smoke inhalation
- 2.24** The two passengers on board were seated in the upper deck seating area and remained there throughout the trip. They were advised of the situation and were not compromised by the fire.
- 2.25** Weather conditions were fine with a 10 knot south westerly wind.
- 2.26** It is likely the fractured fuel line caused diesel fuel, under pressure, to spray on to and saturate the lagging and turbo resulting in ignition.
- 2.27** In 2000, the MSA promulgated a Marine Notice regarding fires in engine rooms that were caused by broken fuel oil lines. This included the importance of checking the engine room for all possible ignition sources, such as exhausts and, where practicable, guarding these with fire retardant material.

## **CONTRIBUTING FACTORS**

*N.B. These are not listed in order of importance.*

- 3.1 The hot operating temperature in the engine room.
- 3.2 The lack of deflection shields to prevent hot surfaces, such as the main engine exhaust, from igniting.
- 3.3 Probable vibration of the vessel causing the fuel pipe to fracture.
- 3.4 Possible over tightening of the delivery nut on the sealing nipple between the fuel pipe and injector.

## **CAUSE**

### **Human Factor**

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Failure to comply with regulations         | <input type="checkbox"/> Drugs & Alcohol | <input type="checkbox"/> Overloading           |
| <input type="checkbox"/> Failure to obtain ships position or course | <input type="checkbox"/> Fatigue         | <input type="checkbox"/> Misconduct/Negligence |
| <input type="checkbox"/> Improper watchkeeping or lookout           | <input type="checkbox"/> Physiological   | <input type="checkbox"/> Error of judgement    |
| <input type="checkbox"/> Lack of knowledge                          | <input type="checkbox"/> Ship Handling   | <input type="checkbox"/> Other . . .           |

### **Environmental Factor**

- |  |   |                                    |  |
|--|---|------------------------------------|--|
| <input type="checkbox"/> Adverse weather | <input type="checkbox"/> Debris           | <input type="checkbox"/> Ice       | <input type="checkbox"/> Navigation hazard |
| <input type="checkbox"/> Adverse current | <input type="checkbox"/> Submerged object | <input type="checkbox"/> Lightning | <input type="checkbox"/> Other . . .       |

### **Technical Factor**

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Structural failure | <input type="checkbox"/> Wear & tear            | <input type="checkbox"/> Steering failure                   |
| <input type="checkbox"/> Mechanical failure | <input type="checkbox"/> Improper welding       | <input type="checkbox"/> Inadequate firefighting/lifesaving |
| <input type="checkbox"/> Electrical failure | <input type="checkbox"/> Inadequate maintenance | <input type="checkbox"/> Insufficient fuel                  |
| <input type="checkbox"/> Corrosion          | <input type="checkbox"/> Inadequate stability   | <input type="checkbox"/> Other . . .                        |

- 4.1 A broken injector line causing fuel and combustible materials to ignite.

## OPINIONS & RECOMMENDATIONS

- 5.1** The crew are to be commended on the manner in which they responded to the fire and contained it. The Master gave clear and concise instructions to his crew and as a result the fire was contained before it could cause more damage.
- 5.2** It is fortunate that the fire occurred whilst there were only two passengers on board. Had it occurred on the Auckland/Northcote run with 143 passengers on board the Master would have had the additional responsibility of controlling a large number of passengers within an area that became smoke filled.
- 5.3** It is essential that crew on passenger vessels that carry a large number of passengers be trained properly in all aspects of fire fighting techniques and procedures. In light of statements from crew, it is recommended that all employees who have been employed by the Company as crew for over 12 months, should attend a basic fire fighting course.
- 5.4** It is recommended that the Company continue to encourage Masters to request and allocate additional time to ensure that trainees are fully trained in operational duties as specified in the QF73A SSM.doc. Maritime Rule 23.27(5)(a) requires the Master to ensure that all crew are trained in the use of fire appliances. Rule 23.27(8) requires that all training sessions held be entered into the ship's logbook. As noted above, (see paragraph **2.1**), Rule 31B.8(2) makes it the owners and Master's responsibility to take into account the requirements of Maritime Rules covering training. Therefore, if circumstances change, then the Master and owner must consider this and review the manning. This is enforced by the condition on the minimum safe crewing document that states, "the effectiveness of the permitted minimum crewing must be continually monitored".
- 5.5** The engine rooms on *Harbour Cat* are relatively small for the kW rating of the engine. Accordingly, it is recommended that the Company give consideration to taking steps to reduce temperatures in the engine room by installing a forced air venting system, altering air intake trunking and examine exhaust outlet options. The Company has stated engine room fans will be installed by 2004.
- 5.6** In addition to improving access to the engine rooms, it is also recommended that the Company put in place documented procedures to ensure engine room inspections are carried out at specified time intervals and that adequate time be allotted in terms of scheduling to enable crew to carry out such inspections. It is important for the safe operation of any vessel that engine room checks be carried out while the engines are running as many mechanical problems, including fuel line failures, are more easily detected in this manner. It is therefore recommended the Company put in place documented procedures to ensure regular inspections are carried out when engines are running.

- 5.7** It is recommended that the company consider including in their shore based safety procedures that the New Zealand Fire Service be notified as part of their response to notification of a fire on a vessel.
- 5.8** Maritime Rule 40A.55 requires new restricted limits craft of 15 metres or more, or any new ship carrying more than 36 passengers and existing ships of 24 metres or more to be fitted with fixed fire extinguishing systems in machinery spaces. Many passenger craft owners / operators fit fixed fire suppression systems over and above the legal minimum requirement.