Report on the investigation of

the grounding at high speed of the leisure powerboat

Sea Snake

near the entrance to Tarbert harbour, Loch Fyne

on 10 July 2005

with the loss of three lives

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Report No 10/2006
March 2006

Extract from

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2005 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

NOTE

This report is not written with litigation in mind and, pursuant to Regulation 13(9) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

CONTENTS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

DfT	-	Department for Transport
GPS	-	Global positioning system
GRP	-	Glass reinforced plastic
hp	-	horse power
kg	-	kilogrammes
kW	-	kilowatt
MCA	-	Maritime and Coastguard Agency
RIB	-	Rigid inflatable boat
RNLI	-	Royal National Lifeboat Institution
RYA	-	Royal Yachting Association
USA	-	United States of America
VHF	-	Very high frequency

SYNOPSIS

(All times are UTC + 1)

At about 0150 on 10 July 2005, the leisure powerboat *Sea Snake* crashed at high speed into a low cliff near the entrance to Tarbert's inner harbour. As a result, three people lost their lives and three others were seriously injured.

The previous day, four married couples, including the owner, left Holy Loch marina on board *Sea Snake* and travelled to Tarbert, Loch Fyne. After the boat had been berthed in the inner harbour, the four couples had an evening meal in a hotel. During the meal, they agreed to visit Stonefield Castle by boat later that night.

At about 0045, three of the couples left the hotel to board the boat, while the fourth couple retired to their hotel room. They boarded *Sea Snake* and left the harbour, and were seen by a yachtsman to be driving competently, keeping to the recognised route out of the harbour. The navigation lights were on and there was laughter from those onboard. There was little wind, the visibility was good and it was a moonless night.

Sea Snake travelled to Stonefield Castle, where the couples stopped to view it. However, in the darkness there was little to see, so they reversed out of the inlet and made passage to return to Tarbert. The sea was calm, and with the boat at high speed the party sheltered from the cold in the cockpit.

Later, the same yachtsman observed a high speed boat travelling south in Loch Fyne, turn into the restricted navigational area of the outer harbour, and then head towards the inner harbour. The yachtsman lost sight of the boat, but shortly afterwards heard a crash. He notified the emergency services, and he and his crew quickly headed for the site of the accident. The yachtsman helped two of the injured people from *Sea Snake* onto his yacht, and local men, police officers and the coastguard soon arrived to assist with the rescue operation. As *Sea Snake* was badly damaged, taking water, and in danger of foundering, she was towed to a ferry slipway near by.

The emergency services arrived at the slipway and found that of the four apparently unconscious people on board, three were dead, including the experienced helmsman.

Post-accident examinations revealed no mechanical faults on *Sea Snake*; the environmental conditions were good; there were no other vessels moving in the area; and the navigational aids marking the entrance were clear. The powerboat had been travelling at high speed and, as it approached the inner harbour, for some reason the helmsman made a turn to starboard and the boat crashed into the rocky shoreline. The impact caused extensive damage to the forefoot of the power boat, also causing the occupants to be thrown forward, with the three in the front of the cockpit suffering fatal injuries as a result.

The postmortem examination toxicology tests on the bodies of the helmsmen, showed that both were nearly 2½ times over the drink-driving limit for motor vehicles.

The MAIB investigation highlighted several contributing factors, including:

- The combination of the effects of fatigue and excessive alcohol consumption was most likely the principal factor contributing to this accident.
- The driver of the powerboat probably became unsure and confused by the navigation marks leading to the inner harbour, and decided to turn *Sea Snake* around to starboard and make another approach.
- The powerboat was being operated at an unsafe speed for the location and prevailing conditions.
- There is little effective legislation in the UK to limit the consumption of alcohol when operating leisure boats. The Tarbert Harbour Authority Bye-Laws did not include any reference to the navigation of a vessel when under the influence of drink or drugs.

The only recommendation that would be appropriate as a consequence of this investigation is identical to a recommendation made in the recent MAIB *Carrie Kate* and *Kets* investigation report, therefore repetition of the recommendation in this report is not necessary (see Section 4).

View of a Pro-Line Powerboat

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *SEA SNAKE* AND ACCIDENT

Vessel details

Registered owner	:	Gordon Thomson
Type	:	Pro-Line 231 Walkaround sports fishing boat
Built	:	April 1997 in USA
Construction	:	GRP
Length overall	:	7.77m
Light draught aft	:	1.00m (approx)
Engine power and type	:	Volvo Penta 5.7 litre V8 inboard petrol engine producing 206kW (280hp)
Service speed	:	About 40 knots
Other relevant info	:	Two counter-rotating propellers

Accident details

Time and date	:	0150 10 July 2005
Location of incident	:	Latitude 53º 52'.076N, longitude 005º 24'.104W on the isthmus of Cnocan Sgairbh, close to the entrance of Tarbert inner harbour, Argyllshire.
Persons on board	:	6
Injuries/fatalities	:	3 fatalities, 1 critically injured and 2 seriously injured.
Damage	:	Major damage to the forefoot, deck lifted from hull, and steering/instrument console damaged.

1.2 NARRATIVE

At about 1030 on Saturday 9 July 2005, a group of 4 married couples started to board the powerboat *Sea Snake* at Holy Loch marina and prepare for a weekend trip to Tarbert, Loch Fyne. Just before midday, when the party of eight were all onboard, *Sea Snake* left Holy Loch, with the boat's owner at the helm. The boat headed out of the Clyde estuary, passed Dunoon and rounded Toward Point to enter Rothesay Sound, after which they headed north-west into East Kyle **(Figure 1)**.

The weather was good, and the party enjoyed snacks and drinks on passage.

At about 1220, a male member of the group water-skied behind the boat as it passed through Burnt Islands into West Kyle. After that, *Sea Snake* approached Tighnabruaich at about 1242, where everyone disembarked and had lunch in the bar of a waterfront hotel. *Sea Snake* left Tighnabruaich at about 1435 and carried on passage along West Kyle.

At about 1500, the boat stopped and two of the wives swam in Ostel Bay. About 30 minutes later, the other helmsman took over the boat's controls and drove it from there to Tarbert. They arrived in Tarbert's outer harbour at about 1540, and then continued into the inner harbour and berthed the boat.

Later, the four ladies went to one of Tarbert's waterfront hotels, their rooms having been booked in advance. Meanwhile the four men remained on board and moved the boat to a different berth.

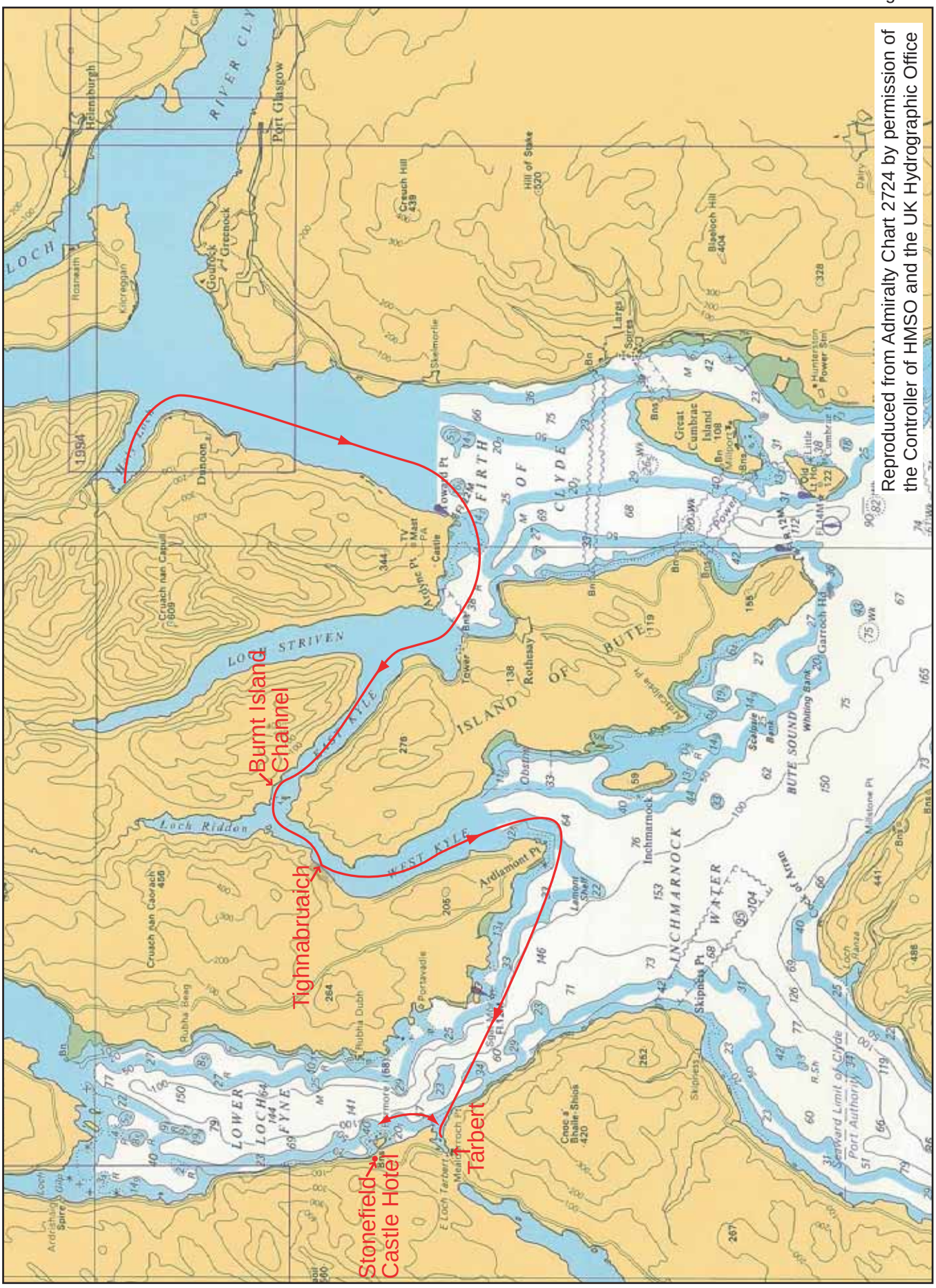
At about 1730, the assistant harbourmaster approached *Sea Snake* and collected the berthing fees. The four men then left *Sea Snake* and went to a public house, where they were joined by their wives. They had drinks and played pool.

At about 2015, the four couples ate at the hotel's restaurant and enjoyed a social evening with music and singing. During the course of the evening they decided to visit Stonefield Castle that night by boat.

At 2300 one couple retired to their hotel room. At about 0045, the other three couples left the hotel and boarded *Sea Snake* with the intention of taking it to see Stonefield Castle, which is about 2 miles north of Tarbert.

The departure of *Sea Snake* from Tarbert was observed by a yachtsman onboard his boat which was moored to an easterly buoy of the inner harbour. He noted that the boat appeared to be driven competently, was keeping to the recognised route out of the harbour, her navigation lights were on and there was laughter from those on board.

Figure 1

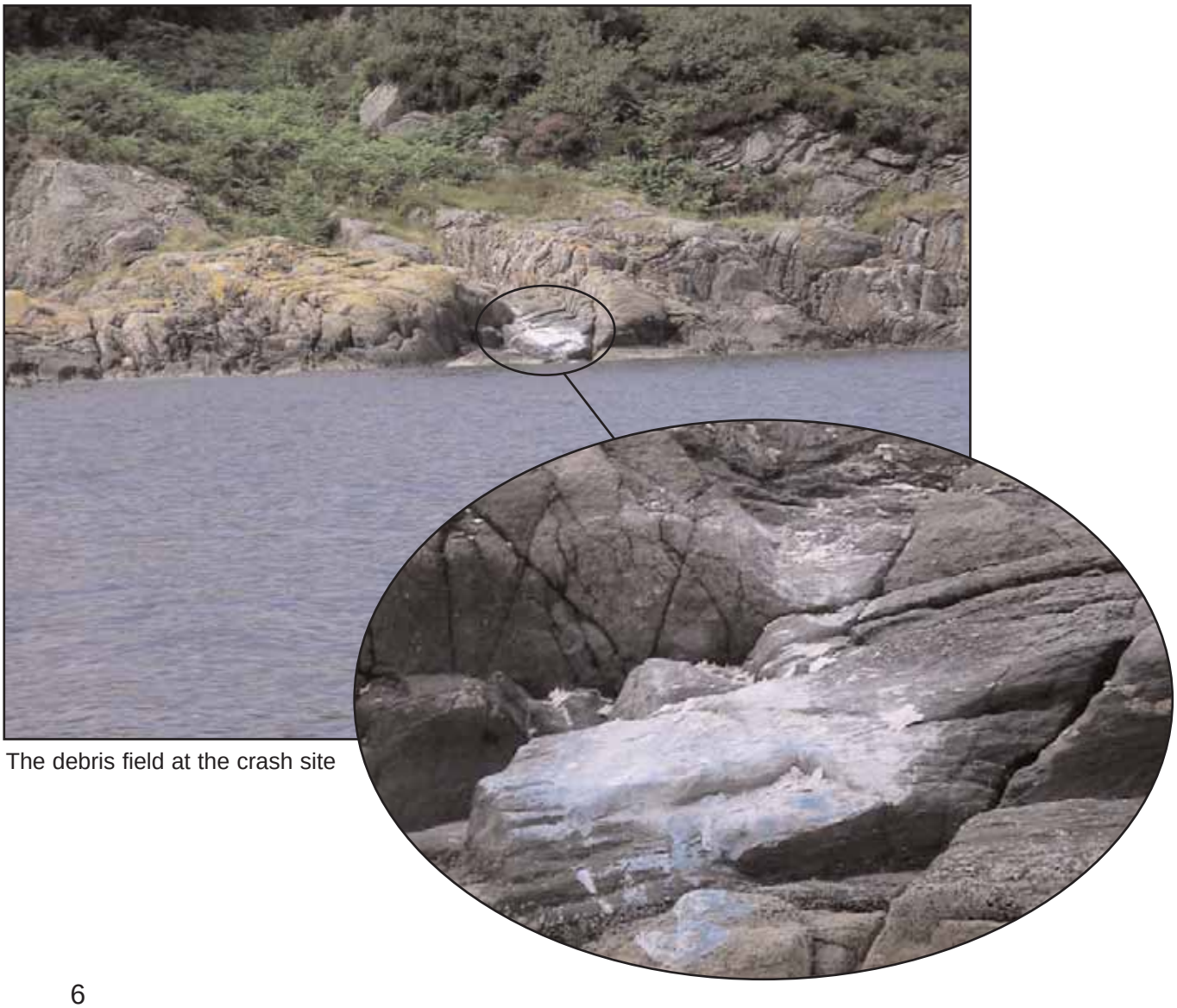

Burnt Island Channel
Tighnabruaich
Tarbert
Stonefield Castle Hotel
Reproduced from Admiralty Chart 2724 by permission of the Controller of HMSO and the UK Hydrographic Office

Sea Snake travelled to Stonefield Castle. The couples stopped to view the castle, but in the darkness there was little to see, so the boat reversed out of the inlet and began the trip back to Tarbert. The sea was calm, and with the boat travelling at high speed, the party sheltered in the cockpit from the cold night air.

Later, the yachtsman who had seen *Sea Snake* depart from Tarbert, noticed the green starboard sidelight of a boat underway to the east of the outer harbour. Within seconds, he saw both sidelights and then only the red port side navigation light. He could see that the boat was moving very fast. The light disappeared from his sight behind Eilean a Choic island (see **Figure 8** at Section 2.5.2) and, very shortly afterwards, he heard a crashing sound.

The forefoot of *Sea Snake* had grounded on the inclined rock just above the high water mark, and then slid down the rock back into deep water **(Figure 2)**. With the boat floating, and her forefoot extremely badly damaged, she began to take on water.

Figure 2



The debris field at the crash site

Realising there had been an accident, the yachtsman used his mobile telephone to contact the emergency services to tell them what he had just seen. He then called Clyde Coastguard on VHF radio channel 16. This call was logged by the coastguard at 0153. The yachtsman informed the coastguard that he would take his yacht out to the scene of the crash. He and his two crew members slipped the yacht from its mooring and made their way to the outer harbour.

Meanwhile, from a house overlooking the outer harbour, people watched as the white navigation light of a motor boat approached the inner harbour from Loch Fyne, and then disappear. Sensing this needed further investigation, they used their car headlights to illuminate the area, and saw the boat across the water, without its lights on. All was quiet; the engine was not running. They called out, but no-one replied. They flashed the lights and shouted out again. This time, a man's voice was heard appealing for help. One of the observers rowed a dinghy from the inner harbour to the ferry slipway at Madadh Maol. By that time, two ambulances, police officers and coastguard auxiliaries had arrived at the slipway. Two police officers and the coastguard sector manager boarded the dinghy and rowed out to the accident site **(Figure 3)**.

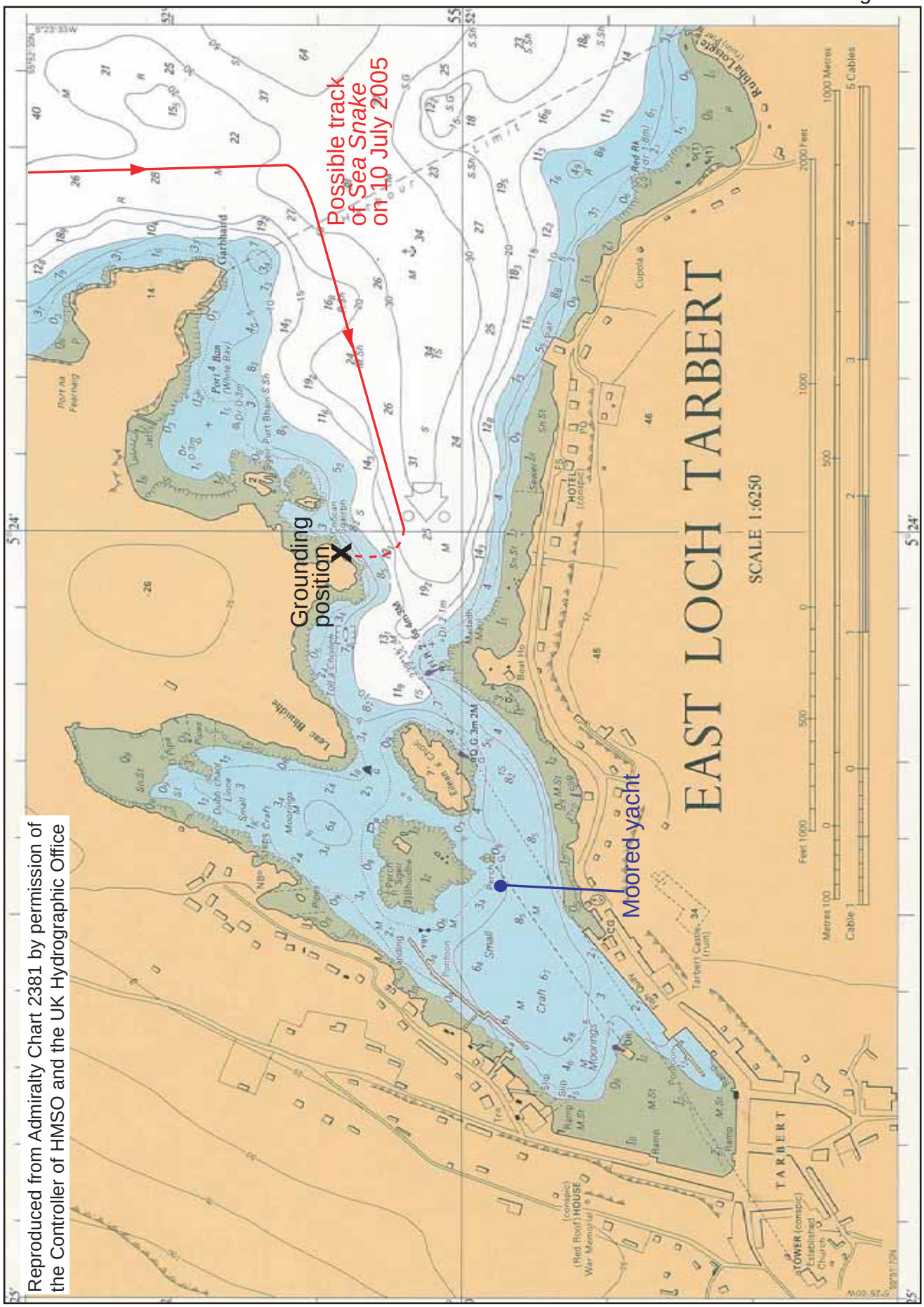
The yachtsman found *Sea Snake* afloat but lying heavily in the water, with a port list and trimmed by the head, adjacent to Cnocan Sgairbh, a rocky point of land situated close to, and to the north of the inner harbour entrance. A male and female voice could be heard calling for help. It was quickly established that six people were on board *Sea Snake,* of which two males were apparently unconscious. The yachtsman passed this information on to the coastguard at 0210.

As the yacht closed with *Sea Snake,* a line was thrown across to her. But no-one was able to make this fast. The yachtsman therefore boarded *Sea Snake* and secured the line. He found the cockpit was filling with water. The two conscious people were transferred to the yacht; the female was wearing an inflated lifejacket. While on board the motor boat, the yachtsman also found four apparently unconscious people, two male and two female, who were lying in the forward part of the boat's cockpit. The yachtsman returned to his yacht and reported his observations to the coastguard via VHF at 0222.

The yacht and motor boat were joined by the dinghy containing the police officers and coastguard auxiliary. The police officers boarded *Sea Snake* and found that one of the women was showing signs of life; the other three people were not.

It was then decided that the motor boat should be towed back to the ferry slipway to prevent it from foundering and where the emergency services' units were waiting. A towline was made fast to *Sea Snake* from the yacht so that the motor boat could be towed to the slipway. As the motor boat was being towed, they were joined by the Tighnabruaich RNLI lifeboat.

Figure 3


Possible track of Sea Snake on 10 July 2005
Grounding position
Moored yacht
EAST LOCH TARBERT
SCALE 1:6250
TARBERT
Garthhaild
Rubha Losgte
Reproduced from Admiralty Chart 2381 by permission of the Controller of HMSO and the UK Hydrographic Office

The yacht passed the towline to those on the slipway, and then proceeded to the inner harbour and made fast to a pontoon at about 0245. Paramedics treated the two survivors' injuries before taking them to hospital.

The emergency services arrived at the slipway and found that of the four apparently unconscious people on board, three were dead, including the experienced helmsman.

1.3 ENVIRONMENTAL CONDITIONS

At the time of the accident, it was fine with partly cloudy skies and good visibility. The sea was calm with little or no swell.

The sun set on 9 July 2005 at 2200, and evening civil twilight ended at 2300. Nautical twilight persisted until 0352 the next day, when morning civil twilight began. The sun rose at 0450.

It was a moonless night.

1.4 *SEA SNAKE*

1.4.1 The powerboat

Sea Snake was built by Pro-Line in Florida (USA) in 1997 as a "sport fishing boat", with a model label of *231 Walkaround*. The motor boat had the capability of being a weekend cruiser with the provision of a two berth cabin forward **(Figure 4)**.

Pro-Line manufactured its boats using a fibreglass stringer system and high density foam core, with multiple layers of hand-laid, bi- and tri-axial woven roving, with high grade resins for greater strength.

The boat complied with US Coast Guard safety standards, and was certified by the National Marine Manufacturers Association.

The large cockpit was laid out as shown in **Figures 5 & 6**, with the helmsman's position forward and on the starboard side. There were passenger seats forward on the port side and aft of the helmsman's position.

On board *Sea Snake*, there was a compartment underneath the cockpit fixed canopy which held a VHF radio.

Safety items such as flares, lifejackets, buoyancy aids, a horn and a first-aid kit were found on board after the accident.

1.4.2 The sale of the boat in April 2005

Gordon Thomson took delivery of *Sea Snake* at the end of April 2005 from Forth Yacht Marina of Grangemouth, who were acting as brokers for the previous owner.

When the Forth Yacht Marina tested the boat before the sale, they found corrosion on a fuel line hose at the fuel filter. This had allowed air to enter the fuel system, causing damage to the fuel pumps. The fuel line and pumps and filter were therefore renewed, after which the engine ran well. The engine oil, gearbox oil, spark plugs and oil filter were also changed at this time.

When the motor boat was tested at sea, the intermediate shaft between the top and lower gearboxes in the stern drive snapped. This item was replaced.

After the sale, the boat was sea tested at Holy Loch Marina, and was found to operate satisfactorily except for the gear control lever. This was later adjusted, and the power steering pump drive belt replaced.

1.4.3 The GPS/chart plotter

Gordon Thomson also had a *Hummingbird 595C* GPS/chart plotter installed in front of the steering position. It had a combined chart plotter and sonar capability in one unit, with a quick disconnect mount. It also had an option to adjust the display illumination so that night vision would not be impaired.

The unit had become detached from its mounting during the accident and was later recovered from the deck of the cockpit. From analysis of the unit's memory card, it was possible to establish that the GPS and chart plotter were orientated to WGS 84 datum. Unfortunately, the unit was damaged to the extent that it was not possible to recover any stored information that might have revealed the vessel's track and/or any waypoints used.

1.5 POST-ACCIDENT EXAMINATION OF *SEA SNAKE*

An examination of *Sea Snake* took place on 20 July 2005 in a garage in Lochgilphead. The condition of the boat was found to be as follows:

1.5.1 GRP hull and deck

The fibreglass hull in the region of the forefoot, to 2m aft of the stem on both the port and starboard sides, had delaminated with the impact, and there were cracks in the hull radiating from the damaged forefoot **(Figure 7)**. The forefoot was extensively damaged, and was open to the sea. The port side of the forefoot was damaged more extensively than the starboard side. The stowed centre line anchor was damaged and had been pushed to starboard.

The deck moulding on the starboard side had lifted away from the hull moulding to about half length from forward. On the port side, the deck had lifted away from the hull to about one third length from forward.

1.5.2 Cockpit

The steering wheel had been pushed into the instrument panel, which was cracked and indented **(Figure 6a)**. Although the steering wheel was displaced from its original position, the steering system operated satisfactorily. Consultants appointed by the police confirmed that the steering system was operable, and failure of the steering power assistance pump would not have restricted a helmsman's ability to steer the motor boat. The glass on the compass binnacle was smashed.

It was also established that the engine throttle control lever was operational, and that the linkage cables to the engine were free and able to operate the throttle mechanism on the upper port side of the engine. The position of the engine throttle control lever was not recorded at the time of the accident, as the rescue operation took priority. The horizontal handle on top of the lever had been broken off, but the lever still moved both forward and astern and seemed to be functioning by engaging the gears to the engine. The engine had moved off its mounting blocks.

The door to the cabin was broken and had come away from its hinges **(Figure 6a)**.

1.6 EXPERIENCE OF THE HELMSMEN

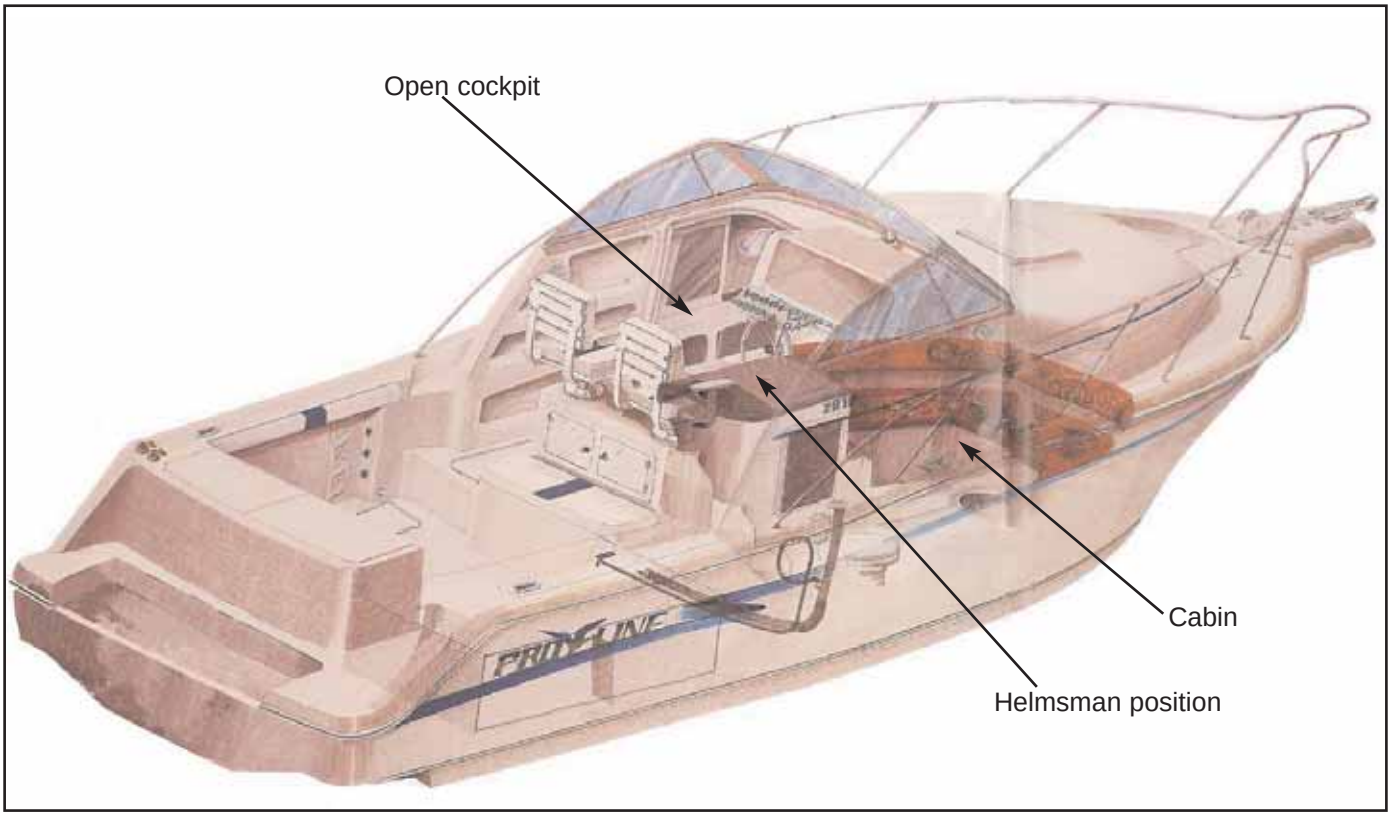
Two men took the helm of *Sea Snake* during the weekend trip:

The owner, Gordon Thomson, was a 42 year old professional man and had operated leisure vessels for much of his life, both sailing and cabin cruisers. He was an experienced powerboat operator; he purchased a Fletcher Arrow type powerboat in 1997 when he was introduced to water skiing. In 2004, he completed his RYA level 2 powerboat training, and purchased two RIBs, before finally buying the significantly larger and more sophisticated *Sea Snake* in 2005. Since buying her, he had operated *Sea Snake* regularly in the daylight and sometimes at dusk and at night. There is no record of him operating *Sea Snake* in or around Tarbert harbour; this was the first time the powerboat had entered Tarbert harbour.

The other helmsman, Robin Brechin, was a 49 year old professional man, and had also operated leisure vessels for much of his life, both sailing and powerboats. He was very experienced in the operation of sailing vessels, and had made voyages to Iceland and Scandinavia in the past. He was also experienced in powerboat operation and water skiing. He had undertaken RYA training to powerboat level 2, safety boat, plus rescue boat and day skipper RYA courses.

Robin Brechin was also the commodore of the Holy Loch Sailing Club, a post he had held since November 2004. He had taken various boats in and out of Tarbert Harbour, but this was the first occasion he had operated in this harbour at *Sea Snake's* helm.

Figure 4

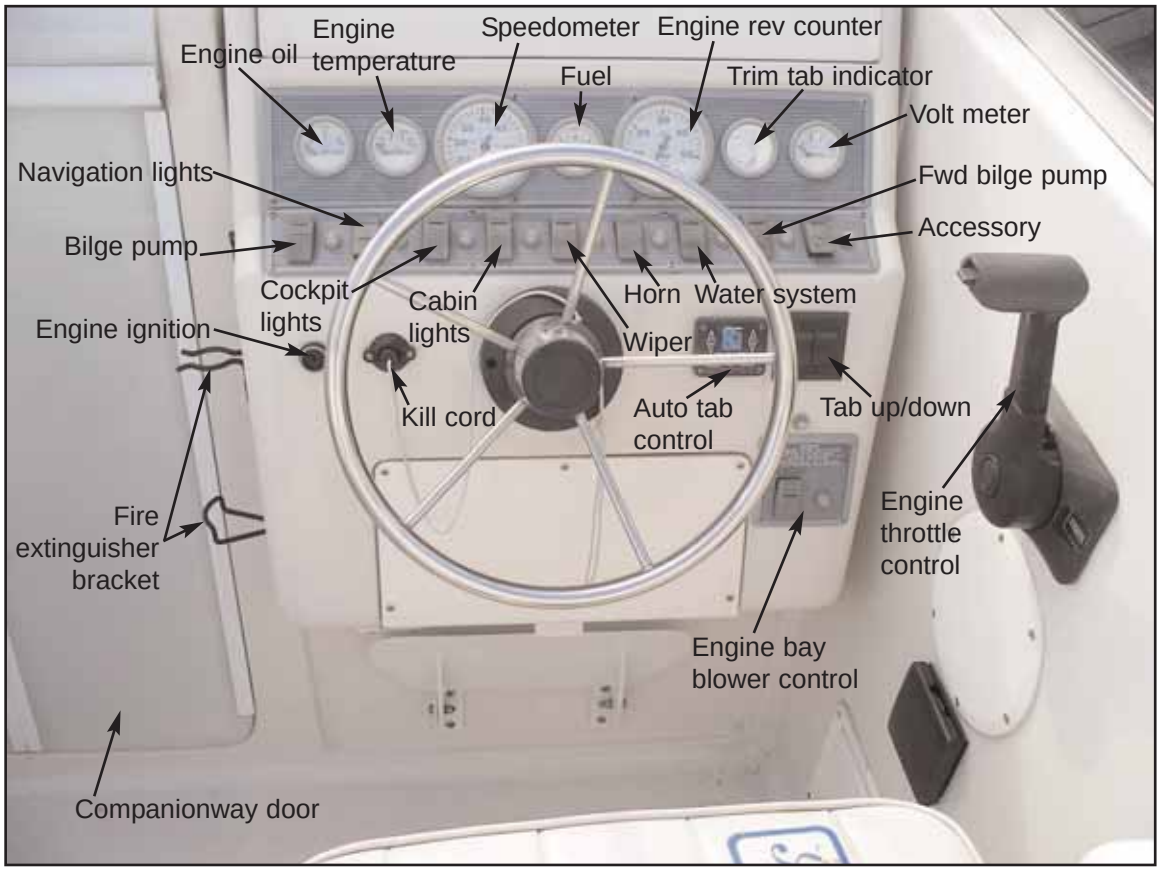


A typical view of a similar Pro-Line boat

Figure 5

A view looking forward from the stern of the cockpit area of another Pro-Line 231

Figure 6



A view of the cockpit steering position, gauges and switches of another Pro-Line 231

Figure 6a

A photograph of the cockpit area showing damage to instrument panel, the engine throttle control lever and the companionway door

Figure 7

Sea Snake stored in a garage

Figure 7a

Looking at the damage to starboard forefoot and bow forward

1.7 TARBERT HARBOUR

1.7.1 The harbour

Tarbert harbour is situated at the west end of East Loch Tarbert, which is on the west side of Loch Fyne **(see Figure 1)**. The harbour limit is a line drawn from Garbhaird to the north to Rubha Loisgte to the south **(see Figure 3)**. The harbour area encompasses two parts of the loch connected by narrows: the outer loch, which serves the ferry port slipway at Madadh Maol point, and the inner harbour, which provides facilities for fishing vessels and small craft.

The Tarbert (Lochfyne) Harbour Authority's Bye Laws 1989 impose a speed limit of 3 knots for the inner harbour, which is situated west of a line from Leac Bhuidhe to the north, and Madadh Maol to the south.

The bye laws also state:

No master shall navigate a vessel:-

(i) Without care or caution; or

(ii) At a speed or in a manner which, having regard to all circumstances at the time, including weather conditions and the type, condition and use of other vessels underway, berthed or moored, or which might reasonably be expected to be underway, berthed or moored, endanger the safety of, or cause injury or damage to any person, any other vessel, buoy, moorings, pontoons or any other property; or

(iii) Without easing the engines when entering the inner Harbour or when passing another vessel employed in dredging, underwater work, or working at a buoy or mooring.

There is no bye-law which covers the navigation of a vessel when under the influence of drink or drugs.

There are two navigational lights to aid entry to the inner harbour. The first light lies about 40m to the north of Madadh Maol point and its characteristics are flash red every 2.5 seconds, with a range of 3 nautical miles. The second light lies about 20m to the south of the island Eilean a Choic and its characteristics are quick flash green, with a range of 2 nautical miles.

The *Admiralty Sailing Directions for the West Coast of Scotland* states:

It is reported that the alignment (252º) of Madadh Maol light with Eilean a Choic Light-beacon (green column), ¾ cable WSW, clears SSE of the coastal bank and dangers fronting the N side of the outer loch.

1.7.2 Examination of the entrance to Tarbert's inner harbour

On the evening of 19 September 2005, an MAIB inspector, the Deputy Procurator Fiscal and police officers dealing with the accident used a police launch to examine the entrance to Tarbert harbour, both in daylight and at night. The daylight run was to familiarise the group with the layout of the navigational marks and the topography of the entrance. A further run was made in darkness to simulate the accident conditions more closely.

Those who undertook the examination of the entrance to Tarbert's inner harbour agreed that the navigational marks were clear and un-obscured, during daylight and darkness, when approaching the inner harbour from seaward. The red navigational light at Madadh Maol was distinctive, and was not obscured by the street lights from Tarbert because the island of Eilean a Choic proved to be a dark back drop. It was also noted from the police launch that the shoreline where the accident occurred was slightly illuminated by nearby street lights. The shoreline would probably have been visible on the night of the accident because nautical twilight persisted throughout.

1.8 POSTMORTEM EXAMINATION AND TOXICOLOGY RESULTS

1.8.1 Gordon Thomson

There were multiple injuries to Mr Thomson's chest, which resulted in severe internal bleeding. The forensic pathologist reported that the injuries were consistent with a heavy impact against a hard surface, such as a cockpit or wheel. The toxicology results showed that he had:

191 milligrammes of alcohol per 100 millilitres of blood; and

225 milligrammes of alcohol per 100 millilitres of urine.

Tests on any presence of drugs were negative.

1.8.2 Robin Brechin

The postmortem examination concluded that Mr Brechin died from severe injuries to his chest. The forensic pathologist reported that the injuries were consistent with a hard impact against a hard surface such as a cockpit or wheel. There were sharp force injuries to his left hand.

The toxicology results showed that he had:

194 milligrammes of alcohol per 100 millilitres of blood; and

240 milligrammes of alcohol per 100 millilitres of urine.

Tests on any presence of drugs were negative.

1.8.3 Isabella Flemming

The postmortem examination concluded that Mrs Flemming died from severe injuries to her chest. She also suffered severe injuries to her neck.

The toxicology results showed that she had:

125 milligrammes of alcohol per 100 millilitres of blood; and

231 milligrammes of alcohol per 100 millilitres of urine.

Tests on any presence of drugs were negative.

1.9 THE RAILWAYS AND TRANSPORT SAFETY ACT 2003

There is no requirement for leisure boat operators to comply with the Railways and Transport Act 2003, but professional mariners are required to comply with Part 4 of the Act *(Alcohol and Drugs)*, Section 78. Professional masters, pilots and seamen commit an offence if their ability to carry out their duties is impaired because of drink or drugs, and if the proportion of alcohol in their breath, blood and urine exceeds the prescribed limit.

The prescribed limits (Section 81) are:

In the case of breath, 35 microgrammes of alcohol in 100 millilitres

In the case of blood, 80 milligrammes of alcohol in 100 millilitres

In the case of urine, 107 milligrammes of alcohol in 100 millilitres.

For the purposes of this section, a master, pilot or seaman is professional if (and only if) he acts as master, pilot or seaman in the course of a business or employment.

Section 79 *Professional staff off duty* states that an offence is committed when a seaman's ability is impaired and, in the event of an emergency, he would or might be required by the nature or terms of his engagement or employment, to take action to protect the safety of passengers.

Section 80 *Non-professionals* has not been enacted but the draft text is as follows:

(1) This section applies to a person who-

(a) is on board a ship which is underway,

(b) is exercising, or purporting or attempting to exercise, a function in connection with the navigation of the ship, and

(c) is not a person to whom section 78 or 79 applies.

(2) A person to whom this section applies commits an offence if his ability to exercise the function mentioned in subsection (1)(b) is impaired because of drink or drugs.

(3) A person to whom this section applies commits an offence if the proportion of alcohol in his breath, blood or urine exceeds the prescribed limit.

(4) The Secretary of State may make regulations providing for subsection not to apply in specified circumstances.

(5) Regulations under subsection (4) may make provision by reference, in particular-

(a) to the power of a motor;

(b) to the size of the ship;

(c) to the location.

SECTION 2 - ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

2.2 POWERBOAT AND HELMSMEN

2.2.1 Powerboat

The 8 year old GRP powerboat, *Sea Snake,* was purchased by the current owner in late April 2005. At that time, she was seaworthy, with all defects being made good by the company selling the boat. There were no reports of any problems with the mechanical, electrical or hydraulic systems onboard the boat during the trip from Holy Loch to Tarbert. Surveys of *Sea Snake* after the accident reached the same conclusion. There were no problems with the systems on the boat and, apart from the accident damage, she would have been seaworthy before the accident. However, because the engine could not be run, practical tests of the controls were not possible. Because the controls operated satisfactorily under manual operation, it is concluded that at the time of the accident there was no mechanical failure to the boat which contributed to this accident.

Therefore, it can be concluded that *Sea Snake* was seaworthy, was operating satisfactorily, and capable of achieving speeds of about 40 knots before the accident.

2.2.2 The helmsmen

The owner of *Sea Snake*, Gordon Thomson, had many years' experience of operating powerboats before owning this boat. He had operated *Sea Snake* safely at least 4 or 5 times since its purchase, always using the GPS, which he had had installed. There is no record of *Sea Snake* being operated during darkness in the area in which the accident occurred .

The other helmsman, Robin Brechin, was also experienced in operating powerboats and sailing boats. He took *Sea Snake* into Tarbert Harbour on the day before the accident, and knew the Tarbert harbour area very well.

Both helmsmen were experienced leisure boat operators, and had received training in powerboat operation to RYA level 2 standard. This course is the RYA's recommended minimum qualification for the operation of powerboats in daylight. It is a basic course, and covers standard procedures for departure, cruising and arrival.

However, the RYA recommends further training up to advanced powerboat level for helmsmen who wish to operate at night.

RYA statistics indicate that, of the 28,000 people in the UK who have successfully completed its level 2 powerboat course, only 7% have subsequently completed training to a higher level. As a consequence, the RYA does actively encourage powerboat users to attend its more advanced powerboat courses before attempting to operate boats at night.

2.3 EVENTS LEADING UP TO THE ACCIDENT

Starting at 1030 on 9 July 2005, the four couples had spent much of the day on *Sea Snake* on the voyage between Holy Loch Marina and Tarbert. During that time, alcohol was consumed by the boat's two helmsmen. Alcohol was also consumed during the lunchtime stopover at Tighnabruaich. More alcohol was consumed by the helmsmen from the time *Sea Snake* arrived in Tarbert, during the afternoon, until three of the couples decided to take her out into Loch Fyne shortly after midnight to see Stonefield Castle. The helmsmen for this additional excursion had neither the training nor the experience that would have been preferable before attempting to con *Sea Snake* during hours of darkness.

The combined effects of fatigue and alcohol, and their potential to impair the ability of the boat's helmsman to con the boat safely, are discussed in Section 2.6. It is of serious concern that responsible boat owners, who presumably would never consider driving their cars while under the influence of alcohol, seem quite prepared to take the controls of powerful craft under the same circumstances.

2.4 THE ACCIDENT

2.4.1 General

Exactly what happened in the cockpit to cause *Sea Snake* to go hard to starboard at high speed, and collide with the rocky shoreline, will not be fully understood. This is because, tragically, everyone who had been sitting or standing at the front of the cockpit lost their lives, and the others who were behind them and survived cannot remember the events leading up to and after the accident.

It is known that there was good visibility; it was fine; that the navigational marks were clear, un-obscured; and the shoreline was probably visible (as subsequently noted by MAIB inspectors, see Section 1.7.2). There were no other vessels operating in the area at the time. Unfortunately, the boat's GPS/chart plotter was damaged in the accident to the extent that it was not possible to examine the equipment's memory and establish the precise track of *Sea Snake* through the outer harbour until the collision.

2.4.2 The accident

Sea Snake was travelling at high speed in the outer harbour, with the intention of going to her berth in the inner harbour. She turned to starboard from her westerly course as she approached the red navigation light at Madadh Maol, but continued her turn, and made heavy impact with the rocks about 100° into the turn.

2.4.3 Speed

The fact that *Sea Snake* was travelling at a high and unsafe speed in a restricted navigational area has been confirmed from a number of sources. The yachtsman observing the boat's lights in the outer harbour reported the boat was travelling at high speed. The injuries to the people at the front of the cockpit, and damage to the steering wheel and console, are indicative of a high speed collision. Furthermore, the damage to the boat's GRP hull and deck, and the wide GRP debris field at the crash site extending about 10 metres inland, are consistent with high speed impact. It would have taken just a few seconds at high speed to turn off their course and hit the rocks if she had been about 70 to 100 metres offshore.

One reason why *Sea Snake* was travelling at high speed in the outer harbour could be that the party onboard were cold, and wanted to return ashore quickly. Another reason could be that, because the boat had entered the outer harbour at high speed the previous day, the helmsman felt confident to operate in the same manner.

At a slow speed, the helmsman would have had more time to react to any unforeseen event or unexpected obstacle, and thereby avoid any hazards. Moreover, if the collision had occurred at a much lower speed it is almost certain the injuries sustained by those on board would have been less serious.

2.4.4 The turn to starboard

Sea Snake turned to starboard, and possibly only completed about 100º before impact. This is concluded from the damage on the port side of her forefoot being more than the starboard side. The damaged anchor being dislodged to starboard is also consistent with this, so, too, is the yachtsman's account of seeing only the red navigation sidelight before she went out of sight behind the rocky island of Eilean a Choic.

With *Sea Snake* proceeding at about 40 knots, her turning circle would have been 10 – 15 boats' waterline lengths, or 70 – 100 metres. This would have provided almost no opportunity for the boat to perform a turn at high speed in the outer harbour of Tarbert without coming dangerously close to the rocky shore. For such a turn to be completed successfully, it would need to be performed at a much slower speed such that a much smaller turning circle is achieved.

2.4.5 Visibility from the boat

The investigation considered the possibility of *Sea Snake'*s windscreen having been obscured by sea water spray. However, reports from those onboard indicate that water would not have accumulated on the windscreen because *Sea Snake* had a high freeboard, and this did not generally happen at speed in calm seas. However, if there had been sea water spray on the screen, this would have added to the difficulties of night time navigation at speed. The accident is unlikely to have been caused by visual impairment because it was reported that the helmsman had good eyesight.

2.4.6 Impact with the rocks

When *Sea Snake's* forefoot hit the rocks, the forward part of her main deck parted from the hull, and there was extensive damage to the forefoot **(see Figures 7 & 7a)**. The forefoot impacted the rocks above the high water mark, and the aft end took on sea water. The forefoot slid down the rock and the boat re-floated into deeper water. Afloat she began to take water through the damaged areas at the forefoot. By the time the yachtsman arrived, *Sea Snake* was filling with water, and was in danger of sinking, with everyone onboard.

2.5 ACCIDENT SCENARIOS

Two likely accident scenarios, which could have resulted in *Sea Snake* veering from its course into Tarbert harbour and striking the shoreline, are discussed below:

2.5.1 Mechanical failure/malfunction

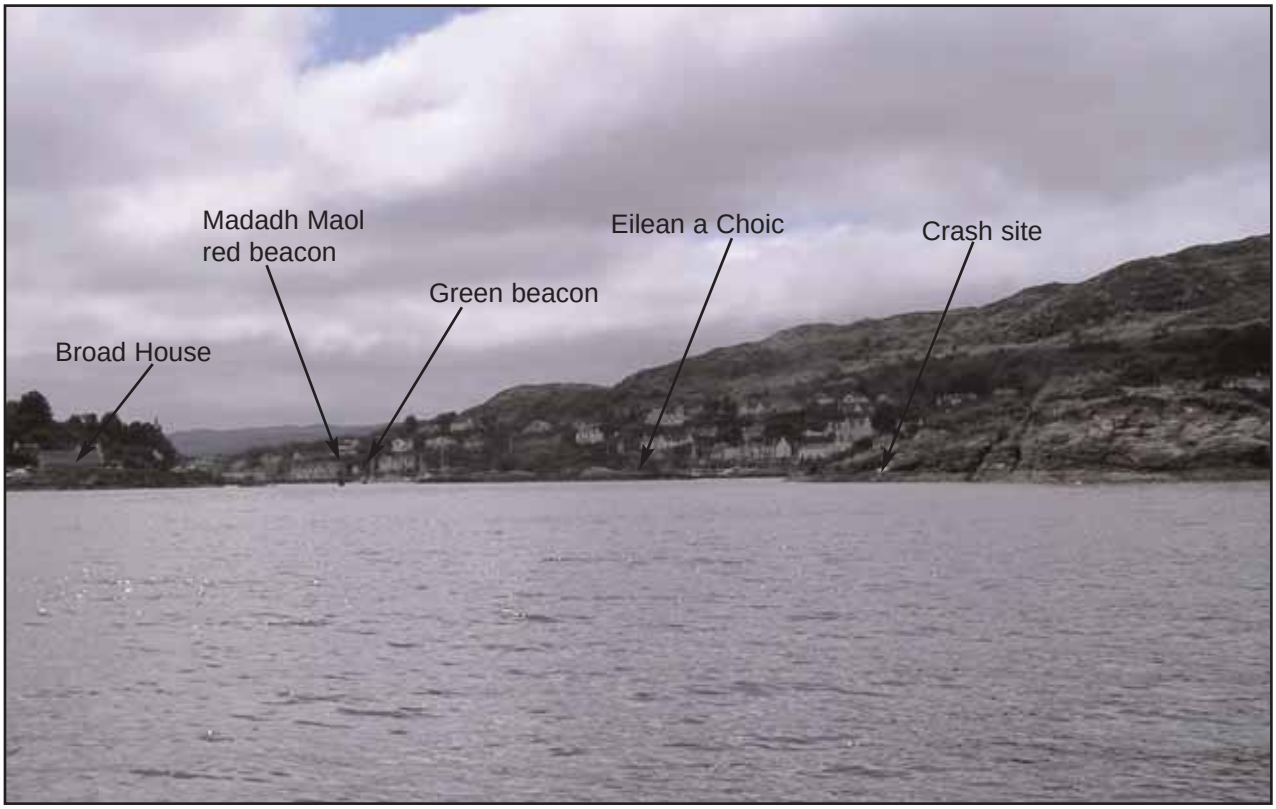
It is possible that a fault in the boat's steering control system caused the helm to move suddenly to starboard. However, if this did occur, one would have expected the immediate reaction of the helmsman would have been to bring the boat's throttle to stop or astern. It is also possible that the helmsman had turned to starboard after finding the throttle jammed, so as to avoid entering the inner harbour at high speed. However, a more logical course of action would have been to turn the ignition off and stop the engine.

Notwithstanding the considerable damage caused to the boat during the collision, it was possible to verify that the engine and steering control systems remained fully functional. It is therefore considered unlikely that the accident was caused by mechanical failure or malfunction.

2.5.2 Navigational error

A more likely scenario is that as the boat approached the entrance to the inner harbour at high speed, the helmsman became confused and unsure about the disposition of the navigation marks leading him into the inner harbour. He would have expected to see a green light on his starboard side when entering a harbour. Instead, the predominant red beacon light was slightly on his starboard side, and the fainter green light was slightly to his port side. It has been confirmed that both of these lights were illuminated, and were clear and unobscured. Very quickly, he made a decision to turn around and make another approach. To do this, he could have chosen to put the helm over to starboard and to bring the boat in a safe area to make a second approach. At the time of making the decision, he possibly did not realise how close he was to the shoreline, and did not provide sufficient area to safely make the turn at high speed. This navigational error probably resulted from a combination of the effect of fatigue and alcohol. This is discussed further in the next section **(see Figures 3 & 8)**.

Figure 8



2.6 FATIGUE AND ALCOHOL

2.6.1 Fatigue

The two helmsmen had been without sleep for about 18 hours, and therefore would have been fatigued.

2.6.2 The effects of alcohol

The effects of alcohol vary highly between individuals. Impairment of motor co-ordination, unsteady gait, slurring of speech, and slowed reaction time are the classic, visible effects. Mood is affected through reduced anxiety, relaxed inhibitions and increased confidence. This can manifest itself through impulsiveness, deliberate risk taking, or insensitivity to risk.

A blood alcohol concentration of roughly twice the drink-driving limit is sufficient to induce gross intoxication (visible effects on speech, gait, motor co-ordination, etc) in 90% of individuals. Four times the drink-driving limit is normally enough to induce coma.

Seasoned drinkers can develop a tolerance sufficient to raise the threshold for a given degree of impairment by two or three times, i.e. by taking exaggerated care, they can mask the symptoms. This learned strategy is more effective with low doses.

2.6.3 Alcohol and the accident

A postmortem established that the two helmsmen were nearly 2½ times over the prescribed motor vehicle limit. *Sea Snake* was travelling at high speed in the outer harbour, in an area where navigation and manoeuvrability were restricted. This was not in accordance with good seamanship. It was clearly unwise to attempt to enter the harbour in darkness at high speed, even if the same approach had been successfully used during the previous afternoon.

The key effects of alcohol pertinent to this accident are:

- Deliberate risk taking
- Poor night vision
- Affected cognitive ability and deterioration of judgment.

Drinking alcohol affects an individual's ability to think clearly and act wisely, and the hazards of drinking and driving a car have been recognised for a long time. The UK's alcohol limits for driving, set in 1966, established a legal limit for driving at 80mg of alcohol per 100 ml of blood, at which level there is already a marked effect on an individual's ability to make decisions. In this accident, both helmsmen were nearly 2½ times the prescribed motor vehicle limit in the UK, or for a professional mariner when carrying out his duties. Travelling across a restricted stretch of water, in near darkness, at high speed, requires good vision, good judgment and quick reaction times. Alcohol will suppress all of these.

2.6.4 The combination of the effects

It is clear that the combination of excessive alcohol consumption and fatigue will have significantly impaired the judgment and reaction times of those on board *Sea Snake*. Evidence suggests these were the principal factors in this accident which resulted in tragically fatal consequences for three people and serious injury for three others.

2.7 LIMITING ALCOHOL CONSUMPTION

This, and other similar accidents where people in high speed leisure craft have lost their lives, highlights a growing problem which should be of concern to all responsible boat users. The use and misuse of alcohol is entirely incompatible with the safe operation of any powered craft at sea or in harbours. The combination of high speed powerboats and alcohol can be particularly deadly.

There were no national laws against navigating on water while under the influence of alcohol until the Railways and Transport Safety Act 2003 imposed alcohol limits on professional mariners. During Parliamentary debate, before the Act was enabled, a number of practical and technical difficulties was envisaged if leisure craft users were included. However, the Department for Transport (DfT) has undertaken to further review the need to include leisure boat users in the Act.

Unlike many harbours, the local bye-laws for Tarbert did not include sections prohibiting navigation while under the influence of alcohol. However, for those harbours that do impose restrictions, the wording of the bye-laws is almost always standardised, making prosecution following any misdemeanour difficult to achieve. Also, in many cases, the scale of punishments available following a successful conviction is inadequate. While some harbourmasters are seeking to update their bye-laws, this is a slow process.

Introducing a national alcohol limit for users of leisure craft, in line with the national driving limits and that already applied to professional mariners, would act as a deterrent. It is considered that limiting alcohol levels for users of leisure craft should not be a local issue to be addressed by bye-laws. Uniform application across the leisure boating sector would clarify legal requirements and avoid legislation-free zones which could attract those choosing to continue to navigate while under the influence of alcohol.

The safety issues from this report are similar to the *Carrie Kate* and *Kets* investigation report, which has recommended that the Department for Transport should work closely with the RYA, MCA and other relevant stakeholders to realise the urgent introduction of national regulations to establish limits on the amount of alcohol which may be consumed by operators of leisure craft. Therefore, repetition of the recommendation in this report is not necessary.

SECTION 3 - CONCLUSIONS

3.1 FINDINGS

1. *Sea Snake* was seaworthy, operating satisfactorily, and was capable of achieving speeds of about 40 knots before the accident. [2.2.1]

2. Both of the helmsmen had received RYA training for daylight operation of a powerboat, but had not received RYA training in the operation of powerboats during darkness. [2.2.2]

3. At the time of the accident, there was good visibility, it was not raining, and the navigational marks were clear and unobscured. No other vessels were operating in that area, and the shoreline was probably visible. [2.4]

4. Damage to the forefoot indicated that the boat was travelling at high speed, and was probably turning to starboard at the time of impact. [2.4]

5. The powerboat was being operated at high speed, possibly 40 knots. This was an unsafe speed considering the location and conditions prevailing. [2.4.3]

6. The helmsman probably became confused and unsure about the disposition of the navigation marks leading him into the inner harbour, and decided to turn around to starboard and make another approach. [2.5.2]

7. The helmsmen would have been suffering from the effects of fatigue, because they had not slept for 18 hours. [2.6.1]

8. *Sea Snake* was being operated by a person who was nearly 2½ times over the alcohol limit to drive a motor vehicle. [2.6.3]

9. The combination of the effects of fatigue and excessive alcohol consumption was the principal factor contributing to this tragic accident. [2.6.4]

10. There is little effective legislation in the UK to limit the consumption of alcohol when operating leisure boats. The Tarbert Harbour Authority Bye-Laws did not include any reference to the navigation of a vessel when under the influence of drink or drugs. [2.7]

SECTION 4 - ACTION TAKEN

MARINE ACCIDENT INVESTIGATION BRANCH

In July 2005 MAIB investigated a fatal accident involving a collision between two leisure boats *Carrie Kate* and *Kets*, in common with this investigation excessive consumption of alcohol was identified as the major causal factor.

In the case of *Carrie Kate/Kets* the following recommendation was made to Department of Transport :

"2005/133 Work closely with the RYA, MCA and other relevant stakeholders to realise the urgent introduction of national regulations to establish limits on the amount of alcohol which may be consumed by operators of leisure vessels."

The only recommendation that is appropriate as a consequence of the *Sea Snake* investigation is identical to the above, and, therefore, repetition of the recommendation in this report is not necessary.

Marine Accident Investigation Branch
March 2006