Report on the investigation of the

capsize of an un-named

Haitian sloop

with the loss of at least 60 lives,

while under tow by Turks and Caicos police launch

Sea Quest

1.5nm south east of South Dock, Providenciales, Turks and Caicos Islands

on 4 May 2007

Marine Accident Investigation Branch
Carlton House
Carlton Place
Southampton
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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.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

DSC	-	Digital Selective Calling
ECHR	-	European Convention on Human Rights
GRP	-	Glass Reinforced Plastic
HP	-	Horse power
HMPE	-	High Modulus Poly Ethylene
kg	-	kilogram
LT	-	Local Time
MPU	-	Marine Police Unit
MTU	-	Military Training Unit
nm	-	Nautical Mile
PC	-	Police Constable
RN	-	Royal Navy
RSS	-	Regional Security System
SAR	-	Search and Rescue
T&A	-	Training and Advisory (Visit)
TCI	-	Turks and Caicos Islands
UKSAT	-	United Kingdom Security Advisory Team
UNCLOS	-	United Nations Convention on the Law of the Sea
USCG	-	United States Coast Guard
USK	-	Underside of keel
VHF	-	Very high frequency

SYNOPSIS

Early in the morning of Friday 4 May 2007, a sloop loaded with approximately 150 illegal migrants was attempting to land at Providenciales, Turks and Caicos Islands (TCI), when it was intercepted by the police launch *Sea Quest*. The sloop was taken in tow towards the island harbour of South Dock, but a short while later, at about 0215, the sloop capsized.

Sea Quest raised the alarm and commenced rescuing survivors. Having rescued all in their vicinity, the launch put into South Dock with 66 survivors onboard. On sailing again, the launch rescued one more survivor from the water before becoming disabled due to a fouled propeller. The next rescue assets to arrive on scene did so at first light, around 0545, when another 11 survivors were found clinging to the hull of the upturned sloop. These were the last passengers to be found alive. In total, 60 bodies were recovered, 12 from the deck and hold of the sloop.

Conclusions

Stability analysis of the sloop indicates that with 125 passengers on deck, it would have negligible stability and the slightest of triggers would have caused capsize. It would appear that the sloop capsized while under tow, when the number of passengers on deck reached a critical number and stability was lost. However, the exact trigger for the capsize remains unknown.

The problem of Haitian sloops with poor stability carrying migrants was well known in the region and among members of the TCI marine police unit (MPU). However, no instructions or operating procedures for mitigating the risk of capsize when interdicting these vessels had been issued to the police launch crews. *Sea Quest*'s captain did what he and other captains had done numerous times before, without realising the potential hazards.

Sea Quest's rescue efforts were commendable, but the launch was ill-equipped for the task. The wider rescue operation suffered from poor communications; lack of central coordination; and slow mobilisation of resources.

Recommendations:

Responsibility for the condition and overloading of the sloop, which ultimately resulted in this tragic accident, rests with those involved with the trafficking of migrants. However, MAIB cannot make recommendations to these individuals, and it remains the responsibility of the government of Haiti to prevent vessels in such unsafe condition putting to sea. Therefore the recommendations in this report have been addressed only to the authorities responsible for the interdiction and SAR roles within TCI territorial waters.

Recommendations, have been made to the TCI police force to:

Review its procedures for the interception of Haitian sloops along the following lines:

- Immediate, until effective procedures are developed: cease actions that are likely to precipitate a sloop's capsize. Initial recommendations addressing this issue have been made by the MAIB in Safety Bulletin 1/2007, reproduced at Annex B.
- Short term: work with the UKSAT MTU to develop standard operating procedures that can be implemented within present resource limitations to facilitate the safe interdiction of sloop traffic.
- Medium term: identify and procure the assets and establish the procedures necessary to achieve the safe interdiction of Haitian sloop traffic.

Take steps to improve TCI's maritime SAR capability by:

- Improving the emergency and lifesaving equipment on the TCI patrol launches and other State vessels.
- Establishing the maximum number of passengers that can be safely embarked on State vessels likely to become involved in SAR operations.
- Ensuring that vessels operating off the coast are able to raise the alarm and communicate effectively between each other and with the authorities ashore. For MPU vessels, this could be done by repairing the police band radio relay stations. However, a more universal solution would be through provision of a VHF channel 16 and DSC alerting service.
- Developing a maritime SAR alerting and coordination plan that can be put into force quickly and effectively once the alarm is raised. For simplicity, responsibility for enacting this would best be co-located with the monitoring of the designated radio circuit.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *SEA QUEST* AND ACCIDENT

Vessel details (Figure 1)

Registered owner	:	Turks and Caicos Police Force
Port of registry	:	Turks and Caicos Islands
Flag	:	Turks and Caicos
Type	:	Halmatic M160 Class Patrol Craft
Built	:	Delivered on 22 December 1989
Construction	:	Glass Reinforced Plastic
Length overall	:	16m (52.5ft)
Gross tonnage	:	18.5 tonnes light
Engine power and/or type	:	2 x MAN V10 820hp diesel engines
Service speed	:	27 knots
Other relevant info	:	ICOM IC M710 MF/HF radio SOLARA Unidem Marine VHF ICOM Police Band Radio transceiver Furuno GP1650F Colour GPS Plotter/Echo Sounder Furuno Radar

Accident details

Time and date	:	Approximately 0215 local time on Friday 4 May 2007 (UTC -4 Hrs)
Location of incident	:	Latitude 21º 43'N Longitude 072º 16'W Bearing 160º from South Dock at 1.5nm
Persons on board	:	5 crew
Injuries/fatalities	:	None
Damage	:	Minor scraping of port bow

1.2 PARTICULARS OF HAITIAN SLOOP AND ACCIDENT

Vessel details (Figure 2)

Registered owner	:	Unknown
Manager(s)	:	Unknown
Port of registry	:	None
Flag	:	None
Type	:	General Purpose
Built	:	Unknown
Construction	:	Wood
Length overall	:	11.32m
Engine power and/or type	:	35hp outboard
Service speed	:	Estimated 5 knots maximum
Other relevant info	:	Sloop rig

Accident details

Time and date	:	Approximately 0215 local time on Friday 4 May 2007 (UTC -4 Hrs)
Location of incident	:	Latitude 21º 43'N Longitude 072º 16'W. Bearing 160º from South Dock at 1.5nm
Persons on board	:	150-200 Haitian nationals
Injuries/fatalities	:	At least 60 fatalities
Damage	:	Capsize, de-masted

Figure 1

Sea Quest

Figure 2

Haitian Sloop - after recovery

1.3 AMBIGUITIES

Much of the narrative has been compiled from the recollections of witnesses and survivors who were too involved in events to note accurate times or keep records. Where accurate times have been recorded, these are annotated LT (local time). All other timings are prefixed appropriately to indicate the confidence that can be placed in them.

As is the normal experience of the authorities intercepting Haitian sloops, it was not possible to identify the captain and crew; they either perished in the accident or were being protected by the survivors.

Although there was some common ground between the accounts of the survivors, there also were many discrepancies. Some allowance can be made for the location of the individual witnesses at the time of the accident and their own perspective of events. Nonetheless, as regards the circumstances of the accident, a number of the scenarios portrayed by the survivors were mutually exclusive.

For completeness, all the versions of the accident encountered by the investigators have been included in this report, and are addressed in the analysis.

1.4 RECORDS

Only two units directly involved in the accident kept any record of the events. These were the police launch *Sea Quest* and the US Coast Guard HH-60J helicopter. Both sets of records have been examined.

It is evident from *Sea Quest*'s log that not all of the record of events is entirely contemporaneous, although this was inevitable given the size of the crew and the pace of events. The log entries from the time the launch's engines were started at 0126 LT, until her arrival at South Dock at 0330 with the survivors, were compiled by the captain retrospectively, albeit before the vessel sailed from South Dock at 0800 LT on Friday 4 May 2007 following removal of the rope round her propeller.

1.5 ENVIRONMENTAL CONDITIONS

The forecast for Grand Turk and Providenciales, for the period overnight 3 to 4 May 2007, issued by the Bahamas Meteorological Department, was for light variable winds. Between 1800 and 0200, the forecast predicted a 40% chance of variable winds of 25 knots, visibility of 2.6nm, thunderstorms and rain.

At 0113 LT, it was recorded that an American Airlines aircraft inbound to Providenciales airport made a missed approach as the weather conditions deteriorated rapidly due to heavy rainfall and poor visibility while the aircraft was on final approach. The aircraft landed safely at 0139 LT. Ashore, the weather feature was reported to have moved across the Caicos islands, causing damage, with some roofs being lifted from houses.

At sea, the wind was reported to be from the south to south-east, 20 knots and gusting, with wave heights of 2-3ft in the area of the accident. The wind is predominantly easterly at this time of year, rarely exceeding force 6 (22-27 knots). Hurricanes at this time of year are rare.

The Turks and Caicos Islands (TCI) are affected primarily by the Antilles Current that generally flows WNW'ly at 0.75 knots in May. The sloop was observed to drift NW'ly at around 0.2 knots, with the debris from the sloop drifting downwind at 0.6 knots.

Sunrise was at 0615, with civil twilight starting at 0553.

1.6 NARRATIVE – THE ACCIDENT

1.6.1 Movements of Haitian sloop

The Haitian sloop departed Haiti in the early hours of Tuesday 1 May 2007, having picked up its cargo of 150 - 200 migrants between 2200 on Monday 30 April and 0200 on 1 May. Over the next 3 days, the sloop sailed and motored towards Providenciales, a distance of 105nm. On 3 May, the sloop laid up to the south of French Cay[1], in order to time its approach to the island for the hours of darkness overnight 3/4 May 2007.

During the passage, the majority of the passengers were kept below deck in the hold, with only some 15-20 of them being on deck at any one time. Water was available in limited quantities from 0.5 litre plastic sachets, as well as some biscuits and other dry food.

1.6.2 *Sea Quest*'s patrol

Sea Quest departed Caicos Marina shortly after 1600 on Thursday 3 May for a routine anti-immigration patrol south of Providenciales and around French Cay, as detailed in the Marine Police Unit's (MPU) weekly patrol tasking schedule. The vessel then proceeded to anchor south of the island in position 21-43.4N 072-15W at 1812 LT, and started radar surveillance of the patrol area **(Figure 3)**. The crew ate their evening meal and, at 2200, the watch was reduced to a single radar operator in the wheelhouse, with the other crew members resting. Each crewman was nominated to keep one 1.5 hour watch during the night.

During the second watch, between 2330 and 0100 on 4 May, an intermittent contact was detected on radar about 8nm to the south of *Sea Quest*, tracking slowly towards Providenciales. At 0125, the watchkeeper, who was the least experienced member of the crew, asked one of his colleagues to check the closing contact before he then informed the captain of his detection at 0126. Believing the contact to be a vessel attempting to land illegal immigrants, the captain made the decision to intercept it.

With the suspect vessel now about 2.5nm to the south, *Sea Quest*'s engines were started, the anchor was raised, and at 0130 the launch was underway closing the contact at 10 knots. All the crew were now awake and making preparations for the interception. The captain was conning the vessel from the flying bridge, with the engineer at the radar display in the wheelhouse passing directions to guide him to the suspect vessel. *Sea Quest*'s approach to the suspect vessel was overt, and her navigation lights and spot lights were on.

The logbook recorded that, at 0143, *Sea Quest* intercepted the vessel, which was identified as a Haitian sloop of wooden construction, heading north under sail and making good 3-4 knots. The crew reported that between 15 and 20 people were on the sloop's deck. As the patrol operating procedure required that any wooden vessel with more than nine persons on deck should be detained for carrying illegal immigrants, the

[1] French Cay is 14.5nm south of Providenciales

Extract of Chart Providenciales TC001 reproduced courtesy of Wavey Line Publishing Figure 3

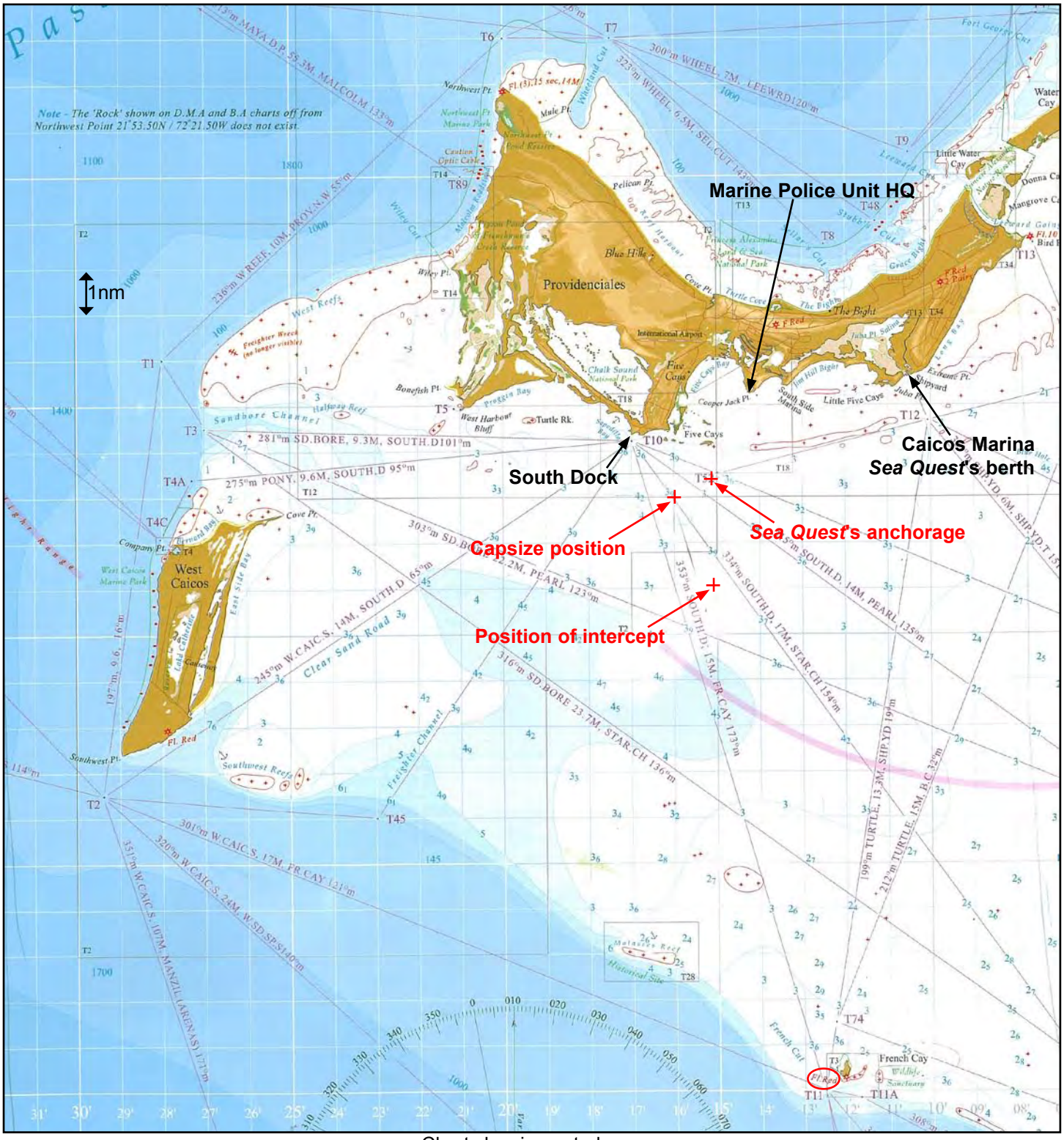


Chart showing patrol area

captain decided to take the sloop in tow. His intention was to tow the sloop to South Dock, the island's main port which was situated some 3.5nm north-north-west of the intercept position. There, it would be met by police and immigration officials who would take custody of the sloop's passengers and crew.

The police launch circled to starboard around the sloop while the crew shouted instructions to the occupants for the sails to be lowered. As this was being done, *Sea Quest*'s captain made his approach on the windward side of the sloop and laid his

launch's port bow alongside the starboard bow of the sloop in order to pass the tow line. The hulls bumped as the two vessels came together, and at this point the police launch crew could see more people beginning to emerge onto the deck of the sloop.

One of *Sea Quest*'s crew rigged a towing bridle across the launch's stern, to which he connected the tow line. The other end of the tow line was then taken forward and passed across to the sloop. In their haste, and unnoticed by the captain, the crew took the tow line along the starboard side of the police launch before passing it to the sloop. To correct the lead of the tow line the captain pivoted his vessel counter-clockwise through 360 degrees, initially using the starboard bow of the sloop to pivot against, and then by driving ahead on the starboard engine and astern on the port.

Once the lead of the towing line had been corrected, *Sea Quest*'s captain moved the launch ahead to take up the slack, and once this was done commenced the tow. The tow was conducted at 5 knots, *Sea Quest*'s minimum speed with both her engines in gear. The rear facing spotlights on the launch were used to illuminate the tow line and the sloop, and two crewmen monitored the evolution: the engineer stood behind the captain watching the sloop, and a crewman stood on deck watching the tow line. The other crewmen moved around the vessel adjusting the spotlights and conducting other tasks.

At approximately 0200, the captain used his mobile telephone to call the officer-in-command of the MPU at home, to inform him that *Sea Quest* had intercepted a Haitian sloop, and that he was towing it to South Dock. At that time the sloop was towing well, following the police launch, and the tow continued normally for about a further 15 minutes. During this time, more people could be seen emerging on deck on the sloop.

At approximately 0215, the engineer shouted to the captain to stop the launch because the sloop had capsized. The captain immediately took the engines out of gear and started to manoeuvre towards the sloop. As he did so, the engineer jumped down onto the main deck and slipped the bridle to release the tow line. Those crew observing from the stern of the police launch estimated that 50-60 persons were on the deck of the sloop when it capsized.

1.6.3 Events onboard the Haitian sloop

Early in the evening of 3 May, the sloop commenced its approach towards Providenciales. With the increasing south to south-east wind assisting its progress, good time was made and the sloop loitered for a while so as not to arrive too early in the night.

The sloop was nearing land when it was intercepted by the police launch. Most of the passengers were still below deck, but some were beginning to emerge on deck and change their clothing in preparation to disembark. The arrival of the police launch caused consternation, and precipitated a general exodus towards the deck, however this was quite slow due to the poor access.

The only access points for movement between the deck and the hold were two hatchless openings; one small square opening immediately aft of the mast, and via an opening at the rear of the low coach roof. As neither of these accesses was served by a ladder, most passengers had to be lifted or pulled up to get on to the deck. The aft access point under the coach roof was harder to use due to the small opening in the coach roof, so most of the passengers used the forward hatch.

As *Sea Quest* laid alongside the sloop to pass the tow line, the bumping of the hulls alarmed those nearest the hull side; aft, some of the outboard engine petrol slopped or spilled, causing a smell of fuel to spread through the aft end of the hold; and forward, a few passengers were of the opinion that there was some increase of water in the bilge. While these events certainly accelerated the movement of the passengers from the hold to the deck, there were no reports of panic.

As the tow got underway, more and more passengers climbed onto the deck.

The survivors' recollections of events thereafter vary widely. A few believed the sloop capsized before the tow commenced; more, that the sloop was under tow for some time, though how long is unclear. Other inconsistencies include the reason for the sloop's capsize; the direction of capsize; estimate of numbers onboard, and so on. This variety of accounts is covered in the analysis.

1.7 NARRATIVE – THE RESCUE

The alarm was raised by the captain of *Sea Quest* telephoning the senior sergeant of the island's marine detachment. The sergeant then commenced notifying his superiors, who in turn contacted other police units, the hospital, and government and private boat owners that could assist. The local police station was notified of the incident at 0245 LT.

1.7.1 *Sea Quest*'s rescue efforts

As soon as the tow line was clear, *Sea Quest*'s captain manoeuvred his vessel back to the sloop which was now lying on its side. Life rings and fenders were thrown to those in the water; and ropes were tied to the side of the launch, the ends of which were then thrown out into the water so that the survivors could pull themselves to the launch.

The inflatable tender was launched, and the engineer made numerous trips to pick up those in the water, returning each time with 6-8 survivors clinging to the small craft. On one occasion, so many survivors attempted to board the inflatable that it became swamped, and the engineer found himself in the water with them. Despite the press of people, *Sea Quest* was able to manoeuvre to the inflatable. The boat was bailed out, the engine restarted, and the engineer recommenced his rescue efforts.

Around 0315, about an hour after the sloop's capsize, *Sea Quest*'s crew had rescued all the survivors in their immediate vicinity and so started a slow patrol of the area looking for others. Finding no-one else alive to rescue, the launch made its way to South Dock with 66 survivors onboard.

At 0330, the survivors were landed ashore to the waiting police and immigration officials and the launch immediately returned to sea, this time with the Acting Commissioner of Police onboard. As *Sea Quest* was passing the anchorage area immediately outside South Dock, a cry for help was heard and a survivor was spotted clinging to the anchor cable of a small trading vessel. This man was rescued and, because of his poor condition, the captain elected to immediately return to South Dock to land him into medical care.

Sea Quest arrived alongside South Dock for the second time at 0400, when it was discovered that a rope had become caught around one of the propellers. The rope was eventually cleared by the engineer diving on the shaft, and *Sea Quest* was able to rejoin the search at 0800.

1.7.2 Fishery Patrol Boats and other vessels

Fishery patrol officers were notified by telephone of the accident between 0330 and 0400 in the morning. They reacted quickly, taking two boats from their base at Turtle Cove on the north side of the island around to South Dock, arriving at first light around 0530. There, one boat embarked a police officer and the other an immigration officer before they proceeded to the scene of the accident.

As the patrol boats commenced their search of the area, a US Coast Guard HH-60J Jayhawk helicopter arrived on scene. Using VHF channel 16, the helicopter was able to direct the patrol boats first to locations of groups of bodies in the water and, subsequently, to a group of survivors clinging to the capsized sloop. Eleven survivors were recovered from the sloop between 0640 and 0700 in the morning, nearly 4½ hours after the accident **(Figure 4)**. These were the last passengers to be found alive and, as some were in need of urgent medical attention, they were taken immediately to South Dock. Thereafter, the patrol boats, which had now been joined by a number of civilian vessels, continued to search the area and recover bodies until 1500 that afternoon.

Photograph courtesy of USCG Figure 4

Survivors standing on hull of sloop

1.7.3 US Coast Guard assets

US Coastguard District Seven, Miami, search and rescue records show that initial notification of the accident was received by telephone from TCI at 0430 LT. An HH-60J Jayhawk helicopter from Great Inagua launched 15 minutes later, arriving on scene at 0606 LT.

At 0635 LT, the helicopter reported locating 20 bodies in the water, and 7 minutes later reported locating the hulk of the sloop, with survivors clinging to it, in position 21-43.7N, 072-16.0W. Local patrol boats were then given vectors to the hulk. Thereafter, the helicopter remained on scene throughout the morning, locating bodies and plotting the debris field which by 0735 LT extended to 0.5nm radius, about 4000m downwind of the hulk. The helicopter landed once at Providenciales airport to refuel, and finally left the scene at 1106 LT. Although the helicopter had a search and rescue swimmer embarked, he was not required to be deployed due to the number of launches and other vessels on scene.

A USCG HC-130 aircraft was launched at 0800 LT to proceed to the island. It arrived on scene at 1055 LT, and conducted an airborne search to the south of Providenciales until 1228 LT when it was released.

A USCG cutter was called to assist, but stood down once it was determined that the area of the accident was too shallow for the cutter to operate safely.

1.8 *SEA QUEST*

1.8.1 Original design

The hull form was initially designed as a motor yacht for the leisure market, but the builders, Halmatic Ltd, recognised that the same hull had the potential to fulfil other capabilities. Using the planing hull form, and by adding an aluminium superstructure, Halmatic Ltd built three M160 Class patrol vessels, all of which were supplied to countries in the Caribbean; one of which was the Turks and Caicos Islands.

Sea Quest was delivered to the TCI government in 1989 to provide the local police force with an appropriate vessel for carrying out counter-narcotics operations.

Sea Quest was originally intended to be used for patrolling and boarding operations. The vessel's design included an internal bridge for general operations, and an external flying bridge helm facility used for close manoeuvring. To enable *Sea Quest* to remain at sea overnight, permanent accommodation for six crew members was provided. To counter potential threats during drug interdiction operations, the vessel was fitted with two mounts for general purpose machine guns, and a drop down firing platform.

1.8.2 Towing capability

When delivered to the TCI police force, *Sea Quest* was supplied with a tow line in cases of propulsion failure or, if necessary, to tow another vessel. Two 7 tonne bollards were fitted, one to each side of the stern quarters. Doubling as mooring and towing bollards, they were designed to accept a bridle arrangement across the stern, through which the eye of the tow line passed **(Figure 5)**. As built, *Sea Quest* had a total engine power of 1100HP, but recent replacement of both engines had increased her power to 1640HP. Working on 50% of total power, with 100HP equating to 1 tonne bollard pull, *Sea*

Figure 5

Sea Quest - towage bridle

Quest was originally capable of towing with a little over 5 tonne bollard pull. It was not envisaged that the vessel would be engaged in towing operations over long distances, or that the towing speed would be in excess of 5 knots.

1.8.3 Lifesaving capability

Sea Quest was fitted with the following lifesaving equipment:

- A life sling to aid recovery of a person from the water.
- 2 lifebuoys complete with lights.
- A 3.5m rigid hull inflatable rescue boat, with 15HP Yamaha outboard **(Figure 6)**.
- A liferaft certified to carry 7 persons.

Search and rescue was not the vessel's primary task, and it was not therefore designed or equipped for such activities. The high freeboard to port and starboard made difficult the recovery of people from the sea, and the absence of guard rails, portable or fixed, along the sides presented a hazard to personnel recovering people in those areas. While the rescue boat boarding ladder set in the transom provided one method of boarding, this was close to both propellers and would have restricted the vessel's manoeuvrability while it was being used.

The vessel was delivered with minimum stability information. There is currently no guidance available to the captain in respect of the maximum permissible passenger carrying capacity.

1.8.4 Inspection of *Sea Quest*

The 18 year old GRP hull showed minor abrasions, but overall appeared to be in good condition. The main and upper deck areas were clean and generally well maintained, with the exception of corrosion on the base of the steel mooring bitts and leads.

Figure 6

Sea Quest - rescue craft

The forward deck housed a 7-man liferaft, correctly secured, with hydrostatic release unit fitted. Adjacent were two substantial inflatable fenders in dedicated stowages. Aft of the liferaft was a general purpose locker which housed a selection of cordage and rope, including three strand nylon, and the HMPE multi-plait tow line **(Figure 7)**. Hand rails were fitted around the aluminium superstructure, but not the sides of the vessel.

The main wheelhouse was fitted with a suite of navigation and communications equipment; the command conning position was on the port side. The arc of visibility from the centreline conning position extended from right ahead to approximately four points abaft the beam on each side. Visibility astern was poor, only a door access provided visibility if open, or a small window if closed. The external deck head of the wheelhouse housed a loudhailer, whistle and searchlight.

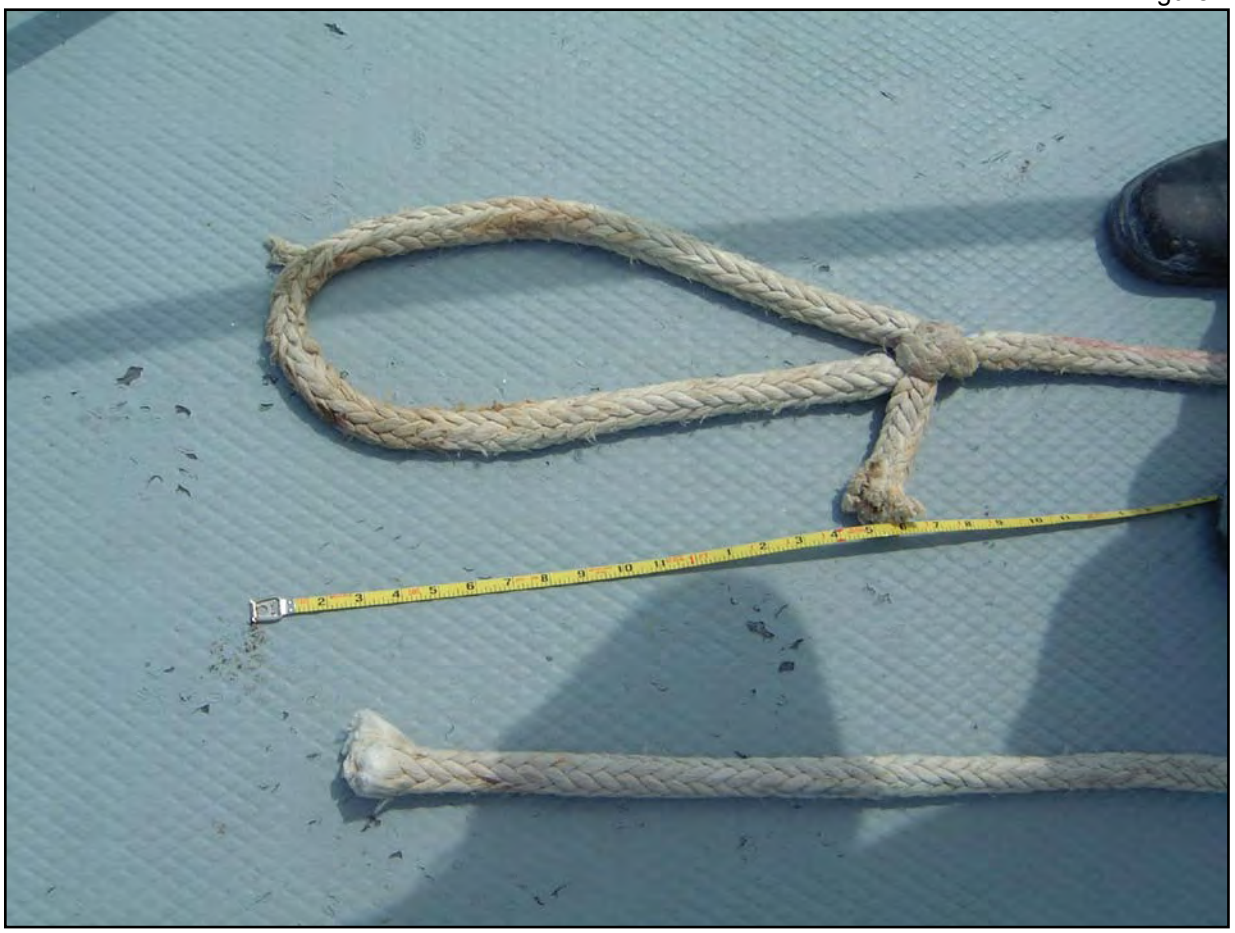
The flying bridge provided an external conning position with good all round visibility of the horizon, but relative poor visibility of operations onboard *Sea Quest*. This was particularly the case observing the fore deck, and was made worse by crazed Perspex dodgers fitted around the conning position.

The hull was in generally good condition, with some scuffing around the sides. The port bow had some scratching in the gel coat, and some light blue paint from another source had adhered to the hull in that area (see **Figure 1**). These was no damage to the stern, nor evidence of any recent repairs to the hull.

1.8.5 Developments post-delivery

In 2006, *Sea Quest* was joined by a second Halmatic launch, *Sea Defender.* Based on the Halmatic pilot cutter hull, *Sea Defender*'s hull form is considered to perform better than *Sea Quest*'s in a seaway, and is designed with an internal stern ramp to assist the launching and recovery of the vessel's sea boat **(Figure 8)**. When compared to the davit launched system fitted to *Sea Quest*, the ramp system potentially provides greater flexibility to launch and recover the boat, and could be used as a simple boarding platform to assist people from the water.

Figure 7



HMPE multi-plait towline

Figure 8

Sea Defender (left) and *Sea Quest* (right) showing differences in recue craft and landing arrangements

The increase to two patrol vessels has allowed one vessel, usually *Sea Defender*, to be based at Grand Turk, and *Sea Quest* to be based at Providenciales. However, the limited number of personnel in the MPU has meant that there is only sufficient manning for one launch in a permanent patrol cycle.

1.9 *SEA QUEST'S* CREW

Five crewmen including the skipper sailed on board the duty patrol launch at any one time. The crew worked a pattern of 5 days on board followed by 2 days leave and were then assigned other duties ashore prior to their next duty period at sea. The captains routinely spent 2 to 3 weeks between assignments while the crew usually worked 1 week-on, 1 week-off, with additional time off for vacations.

1.9.1 The captain

With 20 years in the TCI police force and 18 years in the MPU, he had served as one of the patrol captains for the last 4 years. He had spent 4 months training in Canada and studied navigation and seamanship with the United Kingdom Security Advisory Team (UKSAT) in Antigua as well as 2 months training with the Royal Navy. The captain produced the nightly watchkeeping roster before he went to bed.

1.9.2 The engineer

The engineering trained PC had served with the MPU for the last five years, having worked for the Saint Vincent Coastguard for the previous 12 years. An experienced engineer he had trained with the USCG and the Royal Navy in ship husbandry and repair. The engineer had trained with UKSAT in Antigua, and taught engineering as part of his other duties. He took on the role of senior crewman and was regarded as the captain's second in command.

1.9.3 The boarding party

The two man boarding party consisted of two PCs. Both men had been with the MPU for over 2 years and had received on-the-job training. The two men had received firearms training, and one routinely carried a handgun when approaching vessels suspected of carrying illegal immigrants.

1.9.4 The fifth crewman

The fifth crewman had served in the MPU for 17 years, prior to which he had been a merchant seaman. He had received basic training in Barbados, small craft training in Jamaica and leadership training in Antigua, as well as the on-the-job training from UKSAT. He was responsible for seamanship tasks on *Sea Quest*.

1.10 RECOVERY AND EXAMINATION OF THE SLOOP

On the morning of Friday 4 May 2007, an initial attempt to recover the sloop was made by *Sea Quest* using the original tow line which was still attached to the hulk. However, the police launch experienced great difficulty in towing the capsized sloop, and a Haitian trading vessel at South Dock was finally used to manoeuvre the sloop alongside under the dock crane. Slings were then rigged under the sloop, which was finally lifted ashore at 1145 **(Figure 9)**.

To remove the bodies, it was necessary to remove the cabin structure, and to make cuts into, and to lift, part of the main deck **(see Figure 2)**. This activity and the ensuing damage to the vessel were photographed, and these photographs were available to the investigators during their examination of the wreck. Twelve bodies were removed in total, ten from the hold, and two that were trapped in the rigging on the upper deck.

Figure 9

Haitian sloop being lifted ashore

1.10.1 Construction

The sloop was carvel built, 20mm (0.8”) mahogany planking on cut hardwood frames, joined by wooden knees above the keel. There was no permanent internal, or external, ballast fitted to the vessel. The continuous weather deck was constructed from 20mm (0.8”) mahogany planking secured to rough sawn hardwood log sections forming under deck beams. A large hatch aft 2.13m x 0.76m (7’ 00” x 2’ 06”) covered by a plywood coach roof, and a smaller hatch forward 0.76m x 0.76m (2’ 06” x 2’ 06”) provided the only access below deck. The wooden mast was sighted just forward of the forward hatch 4m (13.12’) from the stem, and was stepped directly through the deck to the wooden keel.

1.10.2 External examination

An external examination of the hull section, other than part of the starboard side which had been landed on the quayside, showed that rags had been used as caulking, reinforced in some areas by the use of epoxy resin. The hull showed signs of recent painting both above and below the waterline. There was no marine growth attached to the hull below the waterline. The examination was unable to identify any structural damage to the hull, other than defective caulking, and a displaced stem head section.

1.10.3 Internal examination

Internally the wooden frames and hull were protected by longitudinal spar ceiling **(Figure 10)**. Personal possessions were littered inside the hull, and a number of small plastic bags were found tied to the spar ceiling and beams; these had been used to hold potable water. Similar bags had been used to dispose of human waste.

Twenty three sand bags were found:15 bags scattered internally around the hull, and further 8 bags adjacent to the sloop on the quayside, presumably moved there to allow the bodies to be recovered. Each bag weighed 50kgs and in total provided 1.15 tonnes of loose ballast. Further ballast was provided by two scrap steel cylindrical pipes 0.46m (18") in diameter and 0.30m (12") long which were stowed right aft.

1.10.4 Propulsion

The sloop's main source of power was derived from two sails, a main sail with an area of approximately 45sq m (485 square feet), and a fore sail with an area of approximately 14.2 sq m (153 square feet). Both sails were locally manufactured using a variety of clothing fabrics. The sailing rig was similar to a lug sail rig. The main sail was laced to a makeshift boom and gaff, the gaff extended forward of the mast to increase main sail area forward. The fore sail was fitted with a bolt rope on the luff, which was used for raising and lowering the sail.

A substantial outboard motor bracket was fitted to the transom stern, its wooden construction showed signs of previous use **(Figure 11)**. Although no outboard motor was recovered with the sloop, Sea *Quest*'s engineer had noticed that an outboard motor had been lying on the aft deck when the vessel was intercepted. Evidence from one of the survivors indicates the outboard motor was a 35 HP Mariner engine. A white plastic 15 gallon drum was found inside the sloop when it was examined ashore. The drum contained less than 1 gallon of liquid, and interviews with the passengers confirmed that it had been stowed below deck and had provided fuel for the outboard motor.

1.10.5 Rigging

The mast was supported by a number of 12mm (0.47") galvanised steel wire rope shrouds and stays, each with a spliced eye or a similar eye formed using bulldog grips. The stays and shrouds were fitted over the mast head and held in place by wooden cheek pieces and secured by nylon webbing straps. At deck level the shrouds were secured by using nylon webbing threaded through holes in extended wooden side frames **(Figure 12)**. The forestays were secured using nylon webbing to connect wire eyes to a steel ring secured to the main stem head fitting **(Figure 13)**.

An array of well worn 14mm to 20mm (0.55" to 0.79") polypropylene ropes was used for sheets, halyards and sail lacing.

1.10.6 Navigation instruments

The sloop was not fitted with an electrical supply, and had no fixed electronic navigational equipment. There was no evidence to indicate the use of hand-held electronic navigational equipment. The only evidence of any navigational equipment onboard, was the remains of a candle in a plastic screen, located on the shelf at the forward end of the rectangular opening under the coach roof. Witness testimony indicated this had been used to illuminate a hand held magnetic compass positioned inside the plastic screen **(Figure 14)**.

Figure 10

Internal view of Haitian sloop

Figure 11

Outboard bracket

Figure 12

Main mast shroud lashings attached to extended frame

Figure 13

Forestays attached to broken stem head

Figure 14

Candle holder to illuminate compass

1.10.7 Pumps and tanks

The sloop was not fitted with any form of permanent pumping arrangement for bilge, fuel or fresh water transfer. There were no through hull fittings to discharge bilge water, nor were there any permanent fuel or fresh water storage tanks.

1.10.8 Damage

It is likely that the sloop suffered damage during the initial capsize; during its recovery to South Dock; when it was lifted ashore; and when the rescue services cut into the deck to remove the bodies of the passengers trapped inside. It is also possible that *Sea Quest* damaged the sloop during her rescue operations in the darkness. Video from the USCG helicopter that attended the rescue, and police photographs taken during the recovery operation, have enabled most of the post-capsize damage to be isolated, providing MAIB with a good understanding of the damage caused during the capsize.

Hull damage

Overall, the hull showed little signs of damage. A few planks were loose at their ends and some caulking had become dislodged. However, there were no impact marks, and photographic evidence indicates that the hull flexed considerably when it was lifted ashore, giving this as the likely source of the damage **(Figure 15)**.

Figure 15

Flexing of hull as sloop lifted ashore

The deck

During the operation to recover the bodies from the wreck, the coach roof covering the aft hatch was removed; a deck section on the starboard side, adjacent to the main aft hatch was cut off; and a deck section athwartships, in way of the forward hatch **(Figure 16)**, was cut off. Some of the gunnels were broken, but photographs of the lifting of the sloop ashore indicate that this was likely caused by the compression of the lifting slings.

The wooden stem head had broken off below its metal reinforcement **(Figures 13 and 17)**, and this was independently examined to determine how it had failed. The examination determined that the stem head had fractured under a load of approximately 1.5 tonnes, and it had failed downwards and backwards, consistent with a pulling force along the sloop's starboard deck edge.

The rig

The mast was found to be broken in two places, one 0.6m (1.97') above the deck, and the other 4.8m (15.75') from the top. The section between the two breaks was missing. The wire stays supporting the port and starboard sides of the mast were intact, still attached to the extended wooden side frames, and with their eyes securely on the cheek plates at the top of the mast. The wire forestay was also found intact, its eye over the cheek plate and its base secured to the detached stem head.

The yard at the top of the sail was intact, as was the small boom at the front of the sail's foot. Both sails were intact, but the running rigging was so entangled that it was not possible to determine with any accuracy whether it had suffered any damage during the initial capsize. That said, witness evidence indicates that the sails had been lowered during the intercept and before the sloop was taken in tow. It is considered, therefore, that any damage to the sails or running rigging is not relevant to this accident.

Figure 16

Sloop with deck areas removed

Figure 17

Sloop bow showing area of damage where stem head fractured

1.11 POST MORTEM EXAMINATION OF THE BODIES

Post mortem examinations of all the bodies were carried out by pathologists flown in from the USA. Without exception, all were found to have drowned, and any pre-death injuries were consistent with what might be expected from such an accident. The pathologists were not able to accurately determine how well hydrated the individuals had been at the time of the accident, but the lack of stomach contents indicated they had not eaten for some time.

1.12 COUNTER ILLEGAL IMMIGRATION ACTIVITIES

1.12.1 The illegal migrant problem

The Haiti country profile on the UK's Foreign and Commonwealth Office website gives a good summation of the issue:

> *"External aid is essential to the future economic development of Haiti, the least developed country in the Western Hemisphere and one of the poorest in the world. Comparative social and economic indicators show Haiti falling behind other low-income developing countries (particularly in the Hemisphere) since the 1980s. Haiti's economic stagnation is the result of earlier inappropriate policies, political instability, a shortage of good arable land, environmental deterioration and chronic deforestation, continued use of traditional technologies, under-capitalisation and lack of public investment in human resources, migration of large portions of skilled population, and a weak national savings rate.*
>
> *…..As the situation deteriorates further the exodus of economic migrants may continue. This is a huge problem affecting the nearby Turks and Caicos Islands…."*

And,

> *"In addition, problems in Haiti can spill over into the wider Caribbean, posing a threat to regional stability. For example, illegal Haitian immigrants are a challenge in the British Overseas Territory of the Turks and Caicos Islands (TCI). Less than 24 hours sailing time from Haiti, TCI has attracted steady numbers of Haitians, in un-seaworthy sloops, looking for employment in the TCI tourism and construction industries. With a tiny population and limited resources, TCI has welcomed this source of cheaper labour. But, increasing numbers brought unsustainable social strains, particularly on health, education and housing."*

TCI police records for 2006 show a total of 19 Haitian vessels were intercepted, containing a total 2359 illegal migrants (1812 male, 547 female). While this represents a sloop arrival every 2.7 weeks, sloop transits are driven by a variety of external factors, including the weather, and it is not uncommon for two to arrive in one week or on the same day.

1.13 MARINE POLICE UNIT (MPU)

1.13.1 Aims and objectives

The main aims and objectives of the MPU are the prevention and detection of persons involved in drugs, firearms and migrant smuggling/trafficking, and search and rescue.

1.13.2 Unit strength

The TCI police force is about 120 strong, of which the MPU numbers 23 personnel. The Marine Division is led by a superintendent, with an inspector as his deputy charged with running the patrol boat section. The captains of the launches are sergeants, and crew members are PCs. The MPU has the following assets:

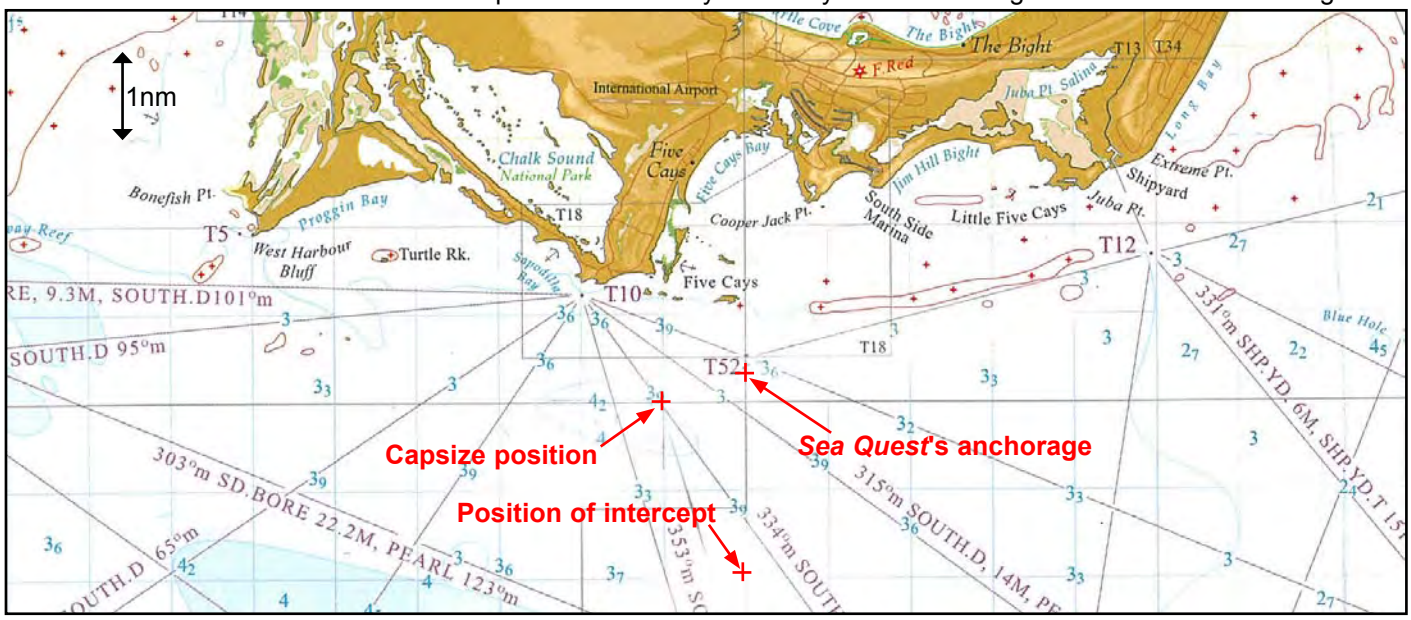
- 1 Halmatic M160 patrol Craft (*Sea Quest*)
- 1 VT Halmatic Cara 52 (*Sea Defender*)
- 2 Boston Whalers (*Sea Justice* and *Sea Eagle*)
- 1 Piper Navajo – long range reconnaissance aircraft, used to obtain early identification of potential drug smuggling or illegal migrant vessels approaching TCI.

1.13.3 Maritime patrols

The MPU carries out overnight patrols on a daily basis. The standard routine consisted of sailing from Caicos Marina, *Sea Quest*'s permanent mooring, at around 1600. The short patrol was then conducted before the launch anchored at about 1830, usually to the south of Bay Cay **(Figure 18)**.

Extract of Chart Providenciales TC001 reproduced courtesy of Wavey Line Publishing

Figure 18



Between 1830 and 2200 all of the crew were available to maintain an anchor and reconnaissance watch.

At 2200, a watchkeeping regime would commence which required each officer to carry out a 1.5 hour combined anchor and radar surveillance watch. The aim of the radar watch was to detect suspicious contacts and track them until they were at a range of 2nm, then inform the captain.

The captain would then decide upon the appropriate action to take. This would normally require the police vessel to close the suspect craft, make a positive identification and carry out a full assessment of the situation. Subsequent actions could include diversion of the craft back outside territorial waters, or taking it in tow to port and landing the passengers into the custody of the TCI immigration department.

1.14 UNITED KINGDOM SECURITY ADVISORY TEAM (CARIBBEAN) MARITIME TRAINING UNIT (UKSAT MTU)

1.14.1 Background

The UKSAT's statement of purpose is "*to enhance law enforcement capacity in the seven RSS countries, Trinidad and Tobago, and the five UK Caribbean Overseas Territories"*[2]. The UK SAT MTU works in partnership with the Regional Security System (RSS) Training Unit, in Antigua, to provide training and advice in support of a range of maritime law enforcement activities, and so assists many Caribbean nations with training their military, coastguard and police marine units. The training is predominantly focused on maritime skill development, and counter-narcotics operations.

1.14.2 Professional Courses

Professional courses for individuals in a range of subjects including, for example, basic seamanship, advanced coxswain skills, and engineering management, are conducted to Royal Navy (RN) standards at Camp Blizzard, Antigua by RN Chief Petty Officers on the staff of the UKSAT MTU.

UKSAT MTU training records from 2000 show 13 members of the TCI marine police unit had recently attended professional courses on Antigua. Only one of *Sea Quest*'s crew on the night of the accident is recorded as having attended a course during that period, which was the basic seamanship course.

1.14.3 Annual Training and Advisory (T&A) Visits

Annual T&A visits, of approximately 1 week duration, are undertaken on the islands, conducted by a team of three officers from the UKSAT MTU. The aim of these visits is to "*provide progressive training to enhance techniques and procedures and advance marine units effectiveness in support of counter-narcotics operations, law enforcement skills, seamanship, navigation, engineering and SAR"*[3].

UKSAT MTU follow-up reports for the annual T&A visits 2004 to 2007 were reviewed. Although the training package varied slightly with each visit, it is evident that the level of training serials did not progress significantly over the period, and skill-fade between visits was a recurrent theme. Training evolutions have remained focused at improving individual levels of knowledge and performance of tasks and drills, and collective training has been focused at platform specific safety evolutions. For example, training in 2007 focused on navigation, Rule of the Road, relative velocity problem solving (course to intercept), anchoring procedure and fire-fighting techniques, through theoretical training ashore and consolidation at sea.

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[2] Regional Security System Training Prospectus 2007/2008.

[3] Regional Security System Training Prospectus 2007/2008.

1.15 INTERNATIONAL OBLIGATIONS

1.15.1 Status of the Haitian passengers

It is not within the scope of this investigation to consider the political status of the passengers onboard the Haitian sloop when it capsized on 4 May 2007.

1.15.2 Detaining the passengers

The sloop was detained by the TCI MPU, because the captain and crew were briefed that vessels with more than nine persons on deck should be considered as carrying illegal immigrants. As such, the sloop was 'arrested' with the intention of taking its occupants into custody. The treatment of arrested persons is dealt with in Article 5 of the European Convention on Human Rights (ECHR): (right to liberty and security of person):

> *1. Everyone has the right to liberty and security of person. No one shall be deprived of his liberty save in the following cases and in accordance with a procedure prescribed by law -…*
>
> *(f) the lawful arrest or detention of a person to prevent his effecting an unauthorised entry into the country or of a person against whom action is being taken with a view to deportation or extradition.*

The ECHR applies in TCI, where there is also the right of individual petition, and Article 5 is given effect to by section 5 of the TCI Constitution (S.I. 2006/1913).

Police forces are permitted to use reasonable force when exercising their powers of lawful arrest. The use of excessive force that causes injury or death to a person detained in police custody might raise issues under ECHR Article 2 (right to life) or Article 3 (prohibition of torture or inhuman or degrading treatment), which are given effect to in sections 2 and 3 respectively of the TCI Constitution. In particular, an obligation arises to conduct an investigation and provide an explanation as to how the injury or death occurred.

1.15.3 Search and rescue

TCI has had extended to it, and has adopted the United Nations Convention on the Law of the Sea (UNCLOS) 1982, and the Safety of Life at Sea (SOLAS) Convention 1974, including the 1988 protocol.

UNCLOS 1982, Article 98, requires every coastal State to promote the establishment, operation and maintenance of an adequate and effective search and rescue service regarding safety on and over the sea and, where circumstances so require, by way of mutual regional arrangements, to co-operate with neighbouring states for this purpose.

SOLAS also stipulates that contracting Governments should undertake to ensure that necessary arrangements are made, "*..for the rescue of persons in distress at sea around its coasts."*

In this way, UNCLOS and SOLAS provide the legal framework for action, although much of the detail is included in the IMO Search and Rescue (SAR) Convention of 1979, which has not been adopted by TCI.

UNCLOS also states that every State must require the master of a ship flying its flag to render assistance to any person found at sea in danger of being lost and to proceed to the rescue of persons in distress.

The SOLAS convention spells out the obligation on ships' masters to render assistance, specifically:

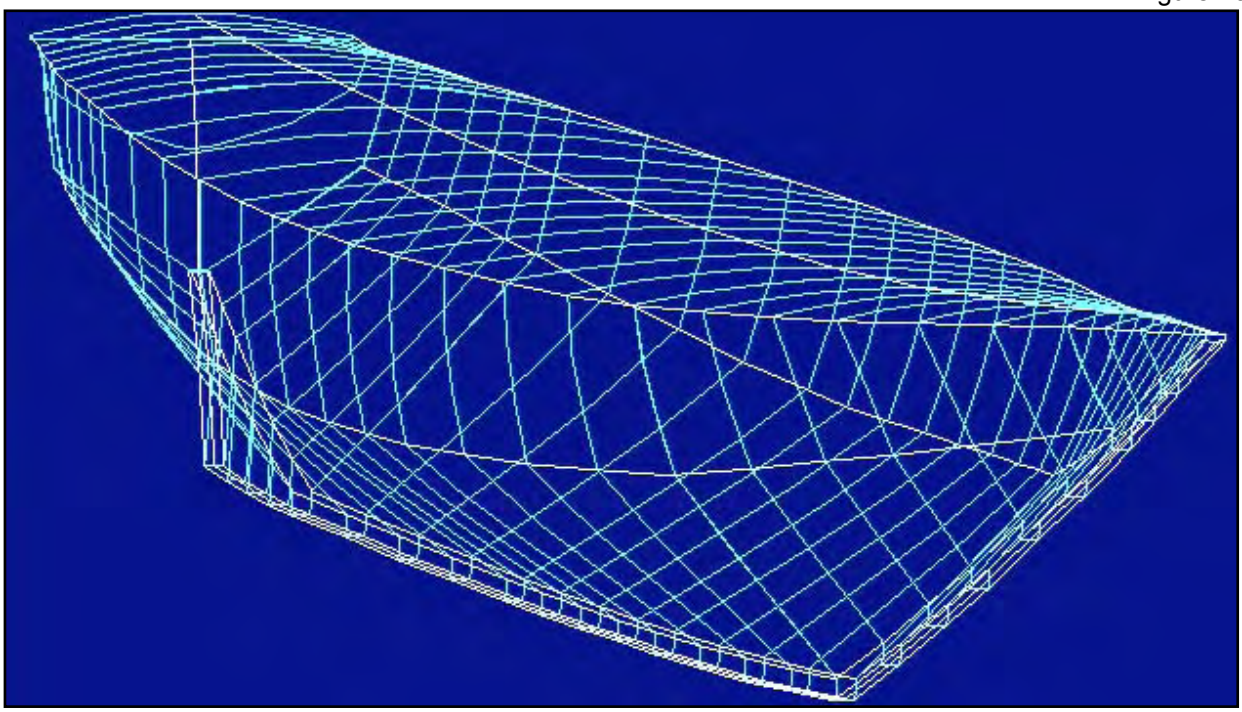
> *"The master of a ship at sea which is in a position to be able to provide assistance, on receiving a signal from any source that persons are in distress at sea, is bound to proceed with all speed to their assistance, if possible informing them or the search and rescue service that the ship is doing so."*

1.16 STABILITY

1.16.1 Raw data

The loss of the Haitian sloop due to capsize raises questions about the vessel's stability. An assessment of the vessel's stability performance was therefore made though, for the following reasons, only an approximate estimate was possible. To conduct a full stability assessment requires: an accurate lines plan; the precise state of loading must be known; and the vessel must undergo an inclining experiment afloat to derive its centre of gravity. None of this was possible, so a degree of estimation was used in deriving centres of gravity and weights. An approximate lines plan was developed from measurements taken from the sloop from which a computer model was generated. **(Figure 19)**.

Figure 19



Stability model used in analysis

The following key weights and centres were assumed:

	Weight (tonnes)	**Vertical Centre of Gravity (m) above USK[4]**
Sloop weight	3.0	1
Ballast	1.5	0.4
150 Passengers (65kg each) • Condition A • Condition B • Condition C	9.75	 1.58 2.15 2.72
Total: • Condition A • Condition B • Condition C	14.25	 1.34 1.72 2.11

The sloop was weighed, and this weight checked against the calculated surface area of wood multiplied by the density of mahogany. An additional factor was added to account for any missing equipment, rigging, spars etc. The weight and number of sand bags found on the vessel was used to derive the total ballast weight. A weight per passenger of 65kg was used, rather than the recognised standard of 75kg, to better reflect the build of the passengers onboard the sloop. The lower figure of 150 persons onboard was assumed.

The stability performance for three loading conditions was estimated:

- Condition A - On passage, with 25 persons on deck and 125 below deck
- Condition B - Prior to capsize, with 75 persons on deck and 75 below deck
- Condition C - Capsize, with 125 persons on deck and 25 below deck

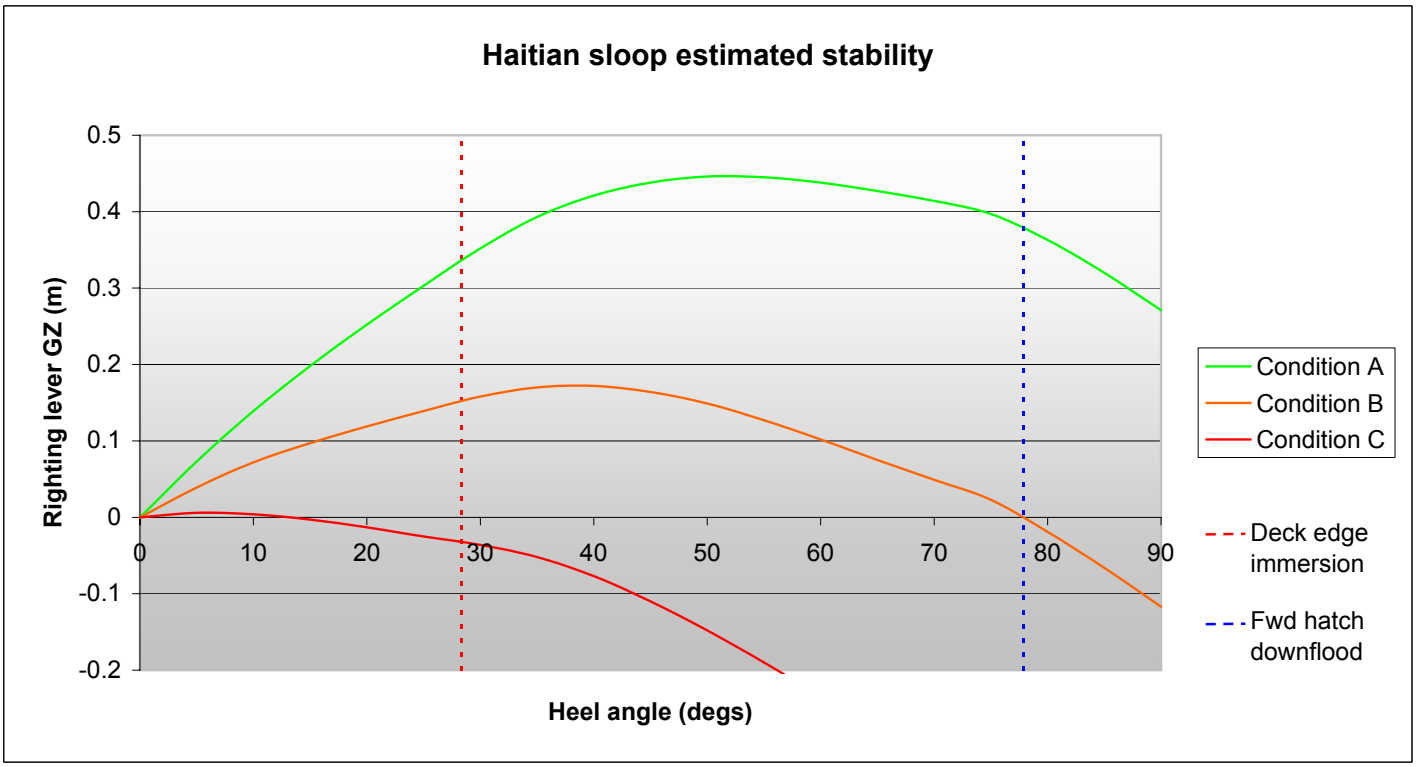
The resulting righting lever (GZ) curve is shown in **Figure 20** and the analysis included at **Annex A**. The righting lever (GZ) is a measure of a vessel's ability to return to the upright when heeled by an external force. The area under the curve bounded between zero and the heeled angle is directly proportional to the moment righting the vessel.

1.16.2 Stability assessment

It can be seen that when most of the passengers are in the hold, Condition A, in effect acting as ballast, the sloop had a healthy level of stability. The vessel also had a good minimum freeboard of 0.95m and the deck edge did not immerse until nearly 30°. In this condition, it is not inconceivable that those onboard would have had no particular concerns about the sloop's stability while on their voyage.

[4] USK = Underside of Keel

Figure 20



In Condition B, when half of the passengers are placed on deck, the sloop's stability diminishes significantly. The area under the GZ curve is less than half of that of Condition A. Extrapolating to the point where 125 passengers are placed on deck, Condition C, the sloop has no stability and hence no resistance to capsize. The smallest external influence, for example wind or wave action, or even the movement of some passengers on deck to one side, would cause the sloop to capsize.

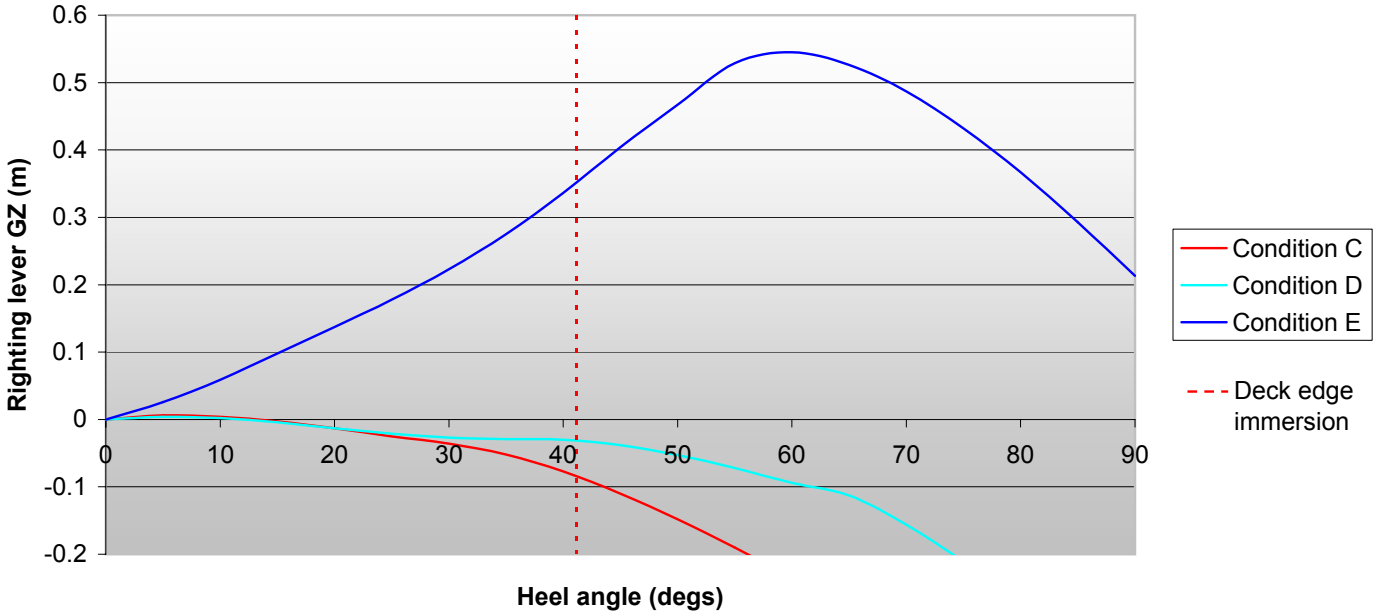
This analysis only provides an indication of the implications of moving a large number of passengers on to the main deck; it does not determine precisely what happened. In reality, the sloop, with the passengers on deck, might have had a greater level of stability than MAIB's assessment indicates, but still not enough to prevent a real risk of capsize being present.

1.16.3 Partial unloading

Using the stability data above, assessments were made of the sloop's stability with some of the passengers removed **(Figure 21)**. Two conditions were calculated: Condition D, with 60 passengers removed (for example had *Sea Quest* alone embarked 60), and Condition E, with 120 passengers removed (*Sea Quest* and *Sea Defender* each embarking 60).

In Condition D, removal of 60 passengers and assuming the remaining 90 were then on deck did not improve stability from the worst case assumption of Condition C (125 on deck, 25 below). The sloop would still have had minimal residual stability and would have been highly susceptible to capsize. When a further 60 passengers were removed, Condition E (using two patrol launches), leaving 30 passengers on deck, the sloop's stability improved significantly.

Figure 21



1.17 PREVIOUS ACCIDENTS

Migrant voyages from Haiti have been prevalent since the late 1970's. However, during this investigation, MAIB has been unable to identify any other occurrences of migrant vessels capsizing while under tow. However, a common thread from the reported incidents of migrant boat losses is loss through capsize. The reports tend to indicate that a significant number of people were being carried on relatively small vessels, resulting in instability due to overloading, movement of people, and water ingress.

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 FATIGUE

On a standard daily operational patrol, assuming no interdiction operation, the crew of *Sea Quest* were likely to achieve in excess of 14 hours rest per day.

Manning scales were considered appropriate for *Sea Quest*'s standard operational tasking, and the crew had only recently commenced this particular patrol period. The evening prior to the accident they had the opportunity, in addition to the daily 8 hours stand by time, to take a minimum 4 hours rest before been woken for duty at 0126. The previous day had passed without incident and therefore maximum rest was achieved.

Fatigue, therefore, is not considered a contributory factor in the accident on 4 May 2007.

2.3 THE ACCIDENT

The trigger for the capsize cannot be stated with certainty, but the underlying problem of the inherent lack of stability of this type of craft when a significant number of passengers are placed on deck was almost certainly the main causal factor in this tragic accident.

2.4 THE DIRECTION OF THE CAPSIZE

There was disagreement over the direction of capsize; *Sea Quest'*s crew all recalled that the sloop capsized to starboard, all but one of the survivors interviewed believed the sloop capsized to port. The sloop was found, at first light, lying on its starboard side.

This was consistent with the direction of capsize reported by *Sea Quest*'s crew, but contrary to the recollection of many of the survivors interviewed. The question of whether it was possible for the sloop to capsize to port, yet end up lying on its starboard side, had to be considered as part of understanding and validating the statements of the witnesses. The perspective of the individual witnesses was taken into account during questioning, and the direction of capsize each witness recalled was either what they believed had occurred, or what they wanted the investigators to believe had occurred. With this as the baseline, the following scenarios were considered:

- The sloop rolled heavily to port, with possible loss of some passengers over the side, before rolling to starboard and capsizing. This scenario partly reconciles the accounts of most of the survivors with that of the police launch crew. However, it assumes that none of the police crew observed the first heavy roll to port, and that none of the survivors were sufficiently aware of what was happening for them to recollect the subsequent roll to starboard and capsize. It is therefore considered unlikely that the sloop capsized in this manner.

- The sloop capsized to port, to the inverted position, then the action of the 11 survivors climbing onto the hull turned it a further 90° to lie on its starboard side. This scenario is partly supported by the recollections of one survivor who claimed that the sloop initially capsized 90°, followed by a further 90° to lie inverted. Had the sloop initially capsized to near the inverted position, the mast, if not already broken, would likely have arrested further roll as it touched bottom; until it did break. The sand bags would have fallen to lie at the lowest point of the hull; probably the underside of the deck and against the hull side. What appears most unlikely, is that the weight of the 11 survivors climbing onto the upturned hull would have been sufficient to move the 1.2 tonnes of sand ballast so that the hull rotated through a further 90° to lie on its starboard side. This scenario is therefore considered improbable.

- The sloop capsized to port and continued its roll through approximately 270° to end up lying on its starboard side. For this to have occurred, the sloop would need to have rolled with significant momentum to overcome the resistance of the water. Had the mast been intact, it would likely have struck the bottom during the roll. The 23 bags of sand in the hold would have fallen onto the port side and the underside of the deck as the sloop made its initial roll. For the hull to continue through an arc of a further 180°, the sand bags would have needed to traverse the underside of the deck to lie against the starboard side of the hull for the sloop to remain stable in that position (as it ultimately did). To have achieved a roll of this nature would have required considerable force. This is discussed further at 2.5.4.

2.5 CAPSIZE TRIGGERS

The accounts of the survivors and the recollections of the crew of *Sea Quest* generated four capsize scenarios. These were:

- That *Sea Quest* collided with or rammed the sloop causing it to capsize.
- That *Sea Quest* pushed the sloop over.
- That the sloop capsized during the tow, either when the tow line became caught under the bow, or when the tow line came at such an angle to the sloop that it was pulled over.
- That the sloop capsized during the tow due to stability loss.

These scenarios are each discussed below.

2.5.1 Collision / ramming

A few witnesses claimed that the sloop capsized following a collision with, or ramming by, *Sea Quest.* However, close inspection of both vessels revealed no signs of collision damage. A small quantity of light blue paint, similar to that on the sloop, was found on *Sea Quest*'s port bow, and this was considered consistent with the captain's description of his initial coming alongside and bumping the sloop.

Sea Quest's approach was made at a relative angle of about 45°, to place the police launch's port shoulder alongside the starboard bow of the sloop. Although fenders were available onboard *Sea Quest*, they were not used during the approach. Coming alongside a slow moving sailing vessel, downwind, is a difficult manoeuvre. As *Sea Quest* slowed down, the launch would have experienced increased leeway and

drift, which at slow speed the captain would have had difficulty controlling. It is not, therefore, surprising that the initial contact between the two hulls was heavy. For anyone at the front of the sloop's hold, the noise would have been considerable, and anyone standing on deck near the point the hulls came together would likely have been alarmed.

However, for the sloop to have capsized early in the interdiction, when only a few passengers were on deck, would have required a collision of sufficient force to cause significant damage below the waterline, with consequential flooding and resultant loss of buoyancy. Such an event would probably have occurred quickly, leaving minimum time for the majority of passengers trapped below deck to escape. Had this occurred, the death toll would have been significantly higher, and the lack of damage to either vessel does not support this scenario.

2.5.2 Pushed over

One survivor claimed that the sloop had been pushed over by *Sea Quest*. The coming together of the two vessels has been described above, and this was followed by *Sea Quest*'s captain leaning the bow of his launch against the sloop in order to commence a 360° port turn to correct the lead of his tow line. It was dark, the wind was strong, and the manoeuvre was made more difficult by the poor view down from the flying bridge to the fore deck. In part, this was due to the design of the flying bridge, but crazing of the perspex screens also hampered the captain's visibility.

The manoeuvre to correct the lead of the tow line was not good seamanship, and it would have been more appropriate for *Sea Quest* to have remained alongside while the tow line was re-rigged. The turn resulted in continued heavy contact between the hulls; it would have resulted in the sloop being pushed around to port, away from the land; and it could have been quite alarming for those near the side, either in the hold or on deck. However, it occurred soon after intercept when it was likely that the sloop's stability was still good, and as most witnesses agreed that the sloop was taken in tow, the scenario of the sloop being pushed over by *Sea Quest* is discounted.

2.5.3 Tow line under the sloop or caught under the bow

Had the tow line been secured to the mast, and negatively buoyant, it is possible that the tow line could have lain across the side of the sloop and under her hull before leading to the stern of the police launch. If the launch then commenced a strong pull, at right angles to the sloop's direction of travel at a time when the latter was in an unstable condition (i.e. with a lot of passengers on deck), this might have caused her capsize.

Such a tow configuration and direction of pull could only have been achieved as *Sea Quest* was commencing the tow, at a time when the sloop was still reasonably stable. However, the tow line used by *Sea Quest* was High Modulus Poly Ethylene (HMPE), which floated, and evidence from the recovery operation shows the tow line was secured to the sloop's stem head. Even though the police launch captain's manoeuvre to turn his vessel around, instead of correcting the tow, was unconventional, it is most unlikely to have resulted in the tow line crossing under the hull and, in any event, the pull of the tow would have been acting on the stem head at the front of the sloop. With this as the point of effort, capsize through the HMPE tow line becoming caught under the hull is considered unlikely.

For the same reason, it is improbable that the sloop capsized during the tow when the tow line became caught under the bow. With the line attached to the stem head, the sloop would have needed to have been yawing extremely heavily for the angle of the tow line to have a lateral effect on the sloop. Such yawing would have made towing the sloop very difficult; to the point that preventative action would have been required. None of the witnesses recalled the sloop yawing.

2.5.4 Capsize during the tow

The police launch crew, and the majority of the survivors interviewed, agreed that the sloop capsized while it was under tow, though there were different accounts over how long the sloop had been under tow before the accident occurred.

Analysis of the sloop's stability shows that with 125 passengers on deck, her stability was negligible. The lowest estimate of numbers onboard was 150, though some survivors claimed almost 250 were onboard. The lower figure is assumed because: a combined total of 138 survivors and bodies was recovered; it is probable that only a small number of bodies went undiscovered; and the number of survivors that might have safely reached the shore is unknown. Ten bodies were removed from the hold and, given the poor access from the hold to the deck, it would have been difficult for more than 10-15 to have escaped the hold during the sloop's capsize. For these reasons, the estimate of around 125 passengers on deck and 25 passengers below in the hold seems credible[5].

In this condition, it would have taken the slightest of stimuli to trigger the sloop's capsize. A slight deviation in the direction of tow, a small yaw, the passengers congregating more to one side, or a strong gust of wind could all have precipitated the sloop's capsize. It cannot be proven how long into the tow it was before sufficient numbers had moved from the hold to the deck, for the sloop to lose stability but, judging by accounts and the limited access points, it is believed to be in the order of 10-15 minutes. However, once sufficient numbers had moved onto the deck, capsize was almost inevitable.

Although all the crew of the police launch reported that the sloop capsized to starboard, it is unlikely that this was the case. The captain was driving the launch, and two crewmen were conducting various duties around the launch. There is no reason why any of these three would have been looking at the sloop at the time it capsized. Two crew were detailed to watch the tow and the sloop, but it would have taken only a moment's distraction for them to have missed seeing the actual capsize. The police crew's belief that the sloop had capsized to starboard was likely derived from seeing the hull lying on its starboard side when *Sea Quest* returned to it to rescue the survivors, or during its recovery. Also, no reason could be identified for the survivors to be other than truthful about their experience. For this reason, the direction of capsize was almost certainly to port.

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[5] *Sea Quest*'s crew estimated only 50-60 passengers were on deck when the sloop capsized. Given their end-on viewpoint, it would have been difficult for them to make an accurate assessment and if their estimate was correct, then the death toll would certainly have been much higher.

Given a capsize to port while under tow at 5 knots, it is possible to explain the force required to turn the sloop to lie on its starboard side, and the fracture to the stem head. Perhaps the only credible theory is that, as the sloop capsized to port, the sail, which had been bundled up on that side (the leeward side) when it was lowered, acted as a drogue on hitting the water. The force of the sail pulling astern would have dragged the sloop's bow to port. Also, this drag, acting through the halyard, probably fractured the mast. As the sloop continued to roll to port and the mast hit the water, the mast was forced backwards and upwards, i.e. to starboard. This action would have caused the stem head fitting to fracture in the direction suggested by analysis. With the point of towing effort now transferred (via the forestay to the mast top) to the wire shrouds, the continued pull of *Sea Quest* as she slowed down would likely have been sufficient to continue the rotation of the sloop until the hull lay on its starboard side. A violent capsize of this nature would also explain why two of the passengers perished, trapped against the deck by the rigging.

2.5.5 Summary of capsize triggers

The divergent and contradictory testimony of the witnesses means that it has not been possible to state with certainty what triggered the sloop's capsize. However, even allowing for some inaccuracies in the MAIB's stability analysis, it is very probable that the sloop would have capsized at some point when sufficient passengers moved from the hold to the deck. The options suggesting the sloop capsized early following the interception by *Sea Quest* are discounted due to the sloop's relatively good stability at that stage, that the tow line was secured to the stem head, and the lack of damage to the two vessels. It is the MAIB's opinion that the sloop most likely capsized during the tow due to lack of stability.

The stability problem is discussed in the next section, however, there are a number of seamanship and boat handling shortcomings that have been identified in this analysis:

- *Sea Quest*'s crew did not use fenders to cushion the interaction between the hulls, even though fenders were available onboard

- *Sea Quest*'s crew did not ensure the tow line was secured to a suitable strong point for towing, and evidence indicates that it was secured to the stem head, a weakened area, by someone onboard the sloop. In this case, the failure of the stem head did not occur as a result of the tow. Had it done so, the point of effort would have transferred to the mast head and the sloop would have been pulled over, almost whatever its stability.

- The tow line was rigged along *Sea Quest*'s starboard side, when the port side would have been more appropriate.

- The decision by *Sea Quest*'s captain to turn his vessel, instead of re-rigging the tow line, risked him fouling his propeller on the tow line, and resulted in him using the sloop to push against during the turn; a potentially hazardous manoeuvre.

- The captain's visibility of his own fore deck was limited, and made worse by crazing of the Perspex windows.

- The use of HMPE rope for towing on a short lead was inappropriate, given its lack of elasticity, its inability to absorb shock loads, and the lack of catenary in the tow.

2.6 THE STABILITY PROBLEM

Over recent years, there have been a number of cases of sloops capsizing, and reports of heavy rolling and near capsize. *Sea Quest*'s crew themselves were of the opinion that the most likely cause of the capsize was excessive numbers of passengers on the deck of the sloop, who moved slightly to one side of the deck in an attempt to avoid the spray coming over the windward side.

2.6.1 Responsibility

Whether significant numbers of passengers would have come on deck later in the voyage is not the issue. When the sloop was intercepted by *Sea Quest*, only 25 or so passengers were on deck. At that time, it is assessed the sloop had reasonable stability – it had crossed from Haiti in a similar condition – and was not in danger of immediate capsize. Although not the intention, the act of intercepting the sloop precipitated the movement of passengers from the hold to the deck. This movement was possibly accelerated by the bumping of the hulls, the smell of spilt petrol in the hold, and some increase in the level of water in the bilge.

Having denied the sloop its freedom to proceed, the marine police were, in effect, arresting the vessel and its passengers. While the sloop and passengers remained in the custody of the police, there was a duty upon them to take reasonable steps to ensure the passengers' safety and right to life.

2.6.2 Operating instructions

The only instruction to the MPU marine patrols relevant to the intercept of sloops was that, if the vessel had more than nine passengers onboard, it was considered to be engaged in moving illegal migrants and should be detained.

No written standard operating procedures for the conduct of detention operations were evident onboard *Sea Quest*, and the crew was aware of none. Their actions on the night followed common practice among the launch crews, derived from previous experience and passed on within the MPU. Specifically:

- Boarding of sloops was permissible by day, but boarding or going alongside should be avoided by night due to the risk of being overrun by passengers from the sloop.
- As communication with the sloops was hampered by lack of a common language, and anyway the sloop crews were not good at following instructions, the easiest way to take them into port was to tow them in.

The potential for sloops to exhibit stability loss was recognised within the MPU. However, the duty implicit on them to ensure the safety of the passengers once the sloops had been intercepted, had not been fully appreciated. Had the inherent risks of towing vessels with unknown stability been properly assessed by the MPU, it is possible that clear, unambiguous guidance and instructions could have been developed for the police launch crews tasked with this type of operation.

On the night in question, *Sea Quest*'s captain was doing what he and other crews had done a number of times in the past, without mishap. However, he had neither the training nor the resources to deal with the problem he, unwittingly, faced.

2.6.3 Dealing with sloop poor stability

It is outside the scope of this investigation to comment on any inter-government initiatives to halt the flow of Haitian migrants to TCI. While a case for raising awareness of the stability problem in the Haitian population could be argued, after days at sea living in the hold of a sloop, it is unlikely that any amount of prior education would affect the behaviour of a crowd of passengers suddenly intercepted within sight of their destination.

Other nations have developed ways of countering the stability problem. At their most simple, these include escorting the vessel into port to be met on arrival by the authorities. In this manner, responsibility for the conduct of the intercepted vessel remains with its master. More complex, but highly effective if it can be achieved safely, is the US Coast Guard procedure of removing the passengers from the sloop. The empty vessel can then be inspected, and subsequently towed in to port or otherwise disposed of. This procedure, however, requires a State owned vessel or vessels of sufficient capacity to safely embark the number of passengers likely to be encountered.

It is clear from the assessments of stability Conditions D and E, at section 1.16.3, that partial removal of passengers can, in certain circumstances be beneficial. In this accident, had both *Sea Quest* and *Sea Defender* been available, and had the two launches taken 120 passengers off the sloop (but see comments on safe maximum capacity below), it would have remained reasonably stable with around 30 passengers left onboard. However, had there been 200 passengers onboard instead of 150, removing just 120 and leaving 80 on deck would not have removed the risk of the sloop capsizing. Attempting a partial removal of passengers could provide increased safety for those removed if the difficulties of safely transferring and subsequently controlling a large number of passengers can be overcome. However, the safety of those remaining onboard would not improve significantly, and a real risk of capsize would continue to exist until almost all the passengers had been disembarked.

Whether contemplating the total or partial removal of passengers, consideration must be given to the number that can be embarked, where they should be held onboard, and how their movements can to be controlled to prevent them massing on one side and so compromising the safety of the police launch. It is unlikely that the TCI MPU could achieve this operation safely within current resources, but the information would also be useful in an emergency situation so that a launch captain knows what his vessel's limitations are. Although *Sea Quest* embarked 66 passengers during the rescue, the 'working' maximum figure of 60 passengers had not been verified by stability analysis and this should be done as a matter or importance.

2.7 THE RESCUE EFFORT

2.7.1 The initial communication

When *Sea Quest*'s captain informed the senior MPU sergeant around 0215 that the sloop had capsized, and that a major rescue operation was required, he did this by mobile phone. Although *Sea Quest* was fitted with an ICOM Police Band radio transceiver, the relay stations ashore were unserviceable, so he was not able to communicate with the police stations by this means. Indeed, he did not try to do so because the relay stations had been out of action for some time while responsibility for repair and maintenance was being resolved.

Each of the three police stations on Providenciales was equipped with a Very High Frequency (VHF) radio and should have been monitoring VHF channel 16. The patrol launches, however, worked autonomously at night and monitoring of VHF channel 16 ashore had fallen into abeyance. For this reason, *Sea Quest*'s captain had discounted this as being an effective method of alerting the police ashore about the assistance he required.

The autonomous nature of the police launch operations, and the lack of an effective radio frequency with which to communicate ashore, resulted in mobile telephone being the primary means of communication. Mobile telephone communication is point to point, it cannot be monitored by other parties involved in the operation, and all messages have to be relayed on. It is considered inadequate as a means of reporting and controlling a major rescue operation.

2.7.2 *Sea Quest*'s equipment

The recovery of 66 survivors from the water was a major task for *Sea Quest*'s crew, which they achieved with speed in difficult circumstances at night. Although the crew threw life buoys, life lines and fenders to those in the water, the 7 man liferaft on *Sea Quest*'s fore deck was not considered. Its use would have provided additional buoyancy for those survivors in the water. Further, had additional liferafts been provided, and the crew been trained in their use, these could have been deployed to provide extra support for the passengers in the water.

Sea Quest's high freeboard hampered the crew in recovering the survivors from the water. The launch was not equipped with a scrambling net or similar device, and with the exception of those that were able to board up the transom ladder, all had to be manually lifted onboard. The rescue operation was therefore protracted, during which time those in the water had little to help keep them afloat.

The engineer launched *Sea Quest*'s small inflatable boat to rescue the passengers, and made numerous trips transferring them to the launch. At one point, his boat became swamped under the weight of survivors. The engineer bailed out the boat, restarted the flooded outboard engine and continued his work. *Sea Quest*'s inflatable boat was small, and therefore not particularly suitable for the rescue of large numbers of people, making the engineer's efforts all the more remarkable. Had a larger rescue boat been available, his part in the rescue might have been even more effective.

Improved rescue equipment, including emergency liferafts and scrambling nets, and in *Sea Quest*'s case a larger rescue craft, would significantly enhance the rescue ability of the present TCI police launches.

2.7.3 Marking the scene

When *Sea Quest* left the scene at around 0315 to return to South Dock, the crew could not hear or see any other survivors in the water. *Sea Quest* did not return to the scene until 0800.

As *Sea Quest* departed the scene, the sloop was unlit and unmarked. Other craft did not arrive to start searching the area until first light, but even then it was not until the USCG helicopter arrived that the upturned hull was relocated and the 11 survivors clinging to it were spotted. Had the sloop been marked with a Dan Buoy and light, this would have aided its relocation and identification had any units been searching for it.

2.7.4 TCI SAR alerting plan

Responsibility for maritime search and rescue around TCI rests with the police force. However, a rescue operation of the scope required when the sloop capsized had not been anticipated, and the alerting of search and rescue assets relied on the knowledge and contacts of a few key police officers. For example, the local police station was advised of the accident by an inspector at 0245 LT, 30 minutes after the sloop capsized. The crews of the two fishery patrol vessels, located on the north of the island, were alerted more than an hour after the sloop capsized. Although they headed for the scene as quickly as possible, they did not arrive until first light, around 0545. The USCG was notified of the accident at 0430 LT, and the HH-60J helicopter subsequently arrived on scene at 0635 LT.

Had the rescue assets been notified earlier, their response would have been quicker. For a period of over 3 ½ hours, when no official craft from the TCI were available on scene to continue the search, 11 survivors successfully returned to the capsized hull to await rescue. Had the sloop broken up or foundered during this time, or the weather deteriorated rather than improved, these lives could have been lost.

2.7.5 Infrastructure

The significant risk of a sloop capsizing, with the consequent need for a rescue operation, had not been considered by the TCI MPU. Although such an emergency could have been predicted had the inherent risks of towing vessels with unknown stability been assessed, no operating procedures were established to respond to marine emergencies on this scale.

The police vessels' primary task of surveillance patrol exists alongside the functions of coastguard and lifeboat; roles that have evolved over time. The suitability and use of *Sea Quest, Sea Defender* and the smaller MPU craft, in conjunction with the fishery protection vessels and available local craft, had not been considered and developed into a response plan. On the night of the sloop's capsize, the coordination of the rescue relied upon the initiative of individual police officers to alert potential responders. With no single TCI police station nominated to take the lead following a major incident; any of the police stations able to receive emergency telephone calls; the internal radio system inoperative and no routine use of VHF channel 16; the rescue effort was not effectively controlled.

Resources are likely to limit the assets that small nations can provide for SAR; they will inevitably rely to some extent on organisations such as the USCG for SAR helicopter and air search support. Similarly, in a major emergency, all State craft will be pressed into service, whatever their primary role. However, based on the evidence of this accident, it appears that improvement to the islands' maritime SAR capability can be made by:

- Improving the emergency equipment on the patrol launches and other State vessels.
- Ensuring that vessels operating off the coast are able to raise the alarm and communicate effectively between each other and with the authorities ashore. For MPU vessels, this could be done by repairing the police band radio relay stations; however, a more universal solution would be through provision of a VHF channel 16 and DSC service.

- Developing a maritime SAR alerting and coordination plan that can be put into force quickly and effectively once the alarm is raised. For simplicity, responsibility for enacting this would best be co-located with the monitoring of the designated SAR radio circuit.

Had such an emergency plan been established and exercised, the ability to respond promptly to a major emergency could have been significantly improved.

SECTION 3 - CONCLUSIONS

3.1 GENERAL CONCLUSION

The main causal factor in this tragic accident was the sloop's inherent lack of stability (2.3)

Once significant numbers of passengers had moved from the sloop's hold to its deck, capsize was almost inevitable (2.5.4).

3.2 SAFETY ISSUES DIRECTLY RELATING TO THE ACCIDENT WHICH HAVE RESULTED IN RECOMMENDATIONS

Having taken custody of the sloop and its passengers, there was a duty upon the TCI police to take reasonable steps to ensure the passengers' safety and right to life (2.6.1).

No instructions or standard operating procedures specific to dealing with the problem of sloop stability had been issued to the crews of the TCI police launches (2.6.2).

3.3 OTHER SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION ALSO LEADING TO RECOMMENDATIONS

The 'working' figure of a maximum of 60 passengers on *Sea Quest* had not been verified by stability analysis (2.6.3).

Communication by mobile telephone is considered inadequate as a means of reporting and coordinating a major search and rescue operation (2.7.1).

Sea Quest was unable to contact other police units due to the police band radio relay stations being inoperative, and because the VHF channel 16 watch in the island's police stations had fallen in abeyance (2.7.1).

Improvements to the lifesaving equipment on the police launches would enhance their capability to respond to major marine emergencies involving people in the water (2.7.2).

The lack of a comprehensive SAR alerting plan potentially delayed the early arrival of other search assets at the scene of the accident (2.7.4)

3.4 SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION WHICH HAVE NOT RESULTED IN RECOMMENDATIONS BUT HAVE BEEN ADDRESSED

There were a number of ship handling and seamanship shortcomings in *Sea Quest*'s approach to the sloop and establishing the tow (2.5.5).

SECTION 4 - ACTION TAKEN

The UKSAT MTU has conducted an early, out of turn, T&A visit to the TCI MPU 18-22 June 2007. The focus of this visit was specifically the problem of intercepting Haitian sloops, and the development of standard operating procedures.

SECTION 5 - RECOMMENDATIONS

Clearly, responsibility for the condition and overloading of the sloop, which ultimately let to its capsize and consequential tragic loss of life, rests with those involved in the trafficking of migrants. However, for obvious reasons, it is impossible for MAIB to make recommendations to these individuals, and it remains the responsibility of the government of Haiti to prevent vessels in such unsafe condition putting to sea. Therefore the recommendations in this report have been addressed only to the Turks and Caicos Islands' authorities responsible for the interdiction and SAR roles within their territorial waters. Accordingly, the TCI police force is recommended to:

2007/162 Review its procedures for the interception of Haitian sloops along the following lines:

- Immediate, until effective procedures are developed: cease actions that are likely to precipitate a sloop's capsize. Initial recommendations addressing this issue have been made by the MAIB in Safety Bulletin 1/2007, reproduced at Annex B.
- Short term: work with the UKSAT MTU to develop standard operating procedures that can be implemented within present resource limitations to facilitate the safe interdiction of sloop traffic.
- Medium term: identify and procure the assets and establish the procedures necessary to achieve the safe interdiction of Haitian sloop traffic.

2007/163 Take steps to improve the islands' maritime SAR capability by:

- Improving the emergency and lifesaving equipment on the TCI patrol launches and other State vessels.
- Establishing the maximum number of passengers that can be safely embarked on State vessels likely to become involved in SAR operations.
- Ensuring that vessels operating off the coast are able to raise the alarm and communicate effectively between each other and with the authorities ashore. For MPU vessels, this could be done by repairing the police band radio relay stations. However, a more universal solution would be through provision of a VHF channel 16 and DSC alerting service.
- Developing a maritime SAR alerting and coordination plan that can be put into force quickly and effectively once the alarm is raised. For simplicity, responsibility for enacting this would best be co-located with the monitoring of the designated radio circuit.

Marine Accident Investigation Branch

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