Report on the investigation of

the collision and subsequent foundering of

Global Mariner

at Matanzas, Orinoco River, Venezuela

on 2 August 2000

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Extract from

The Merchant Shipping

(Accident Reporting and Investigation)

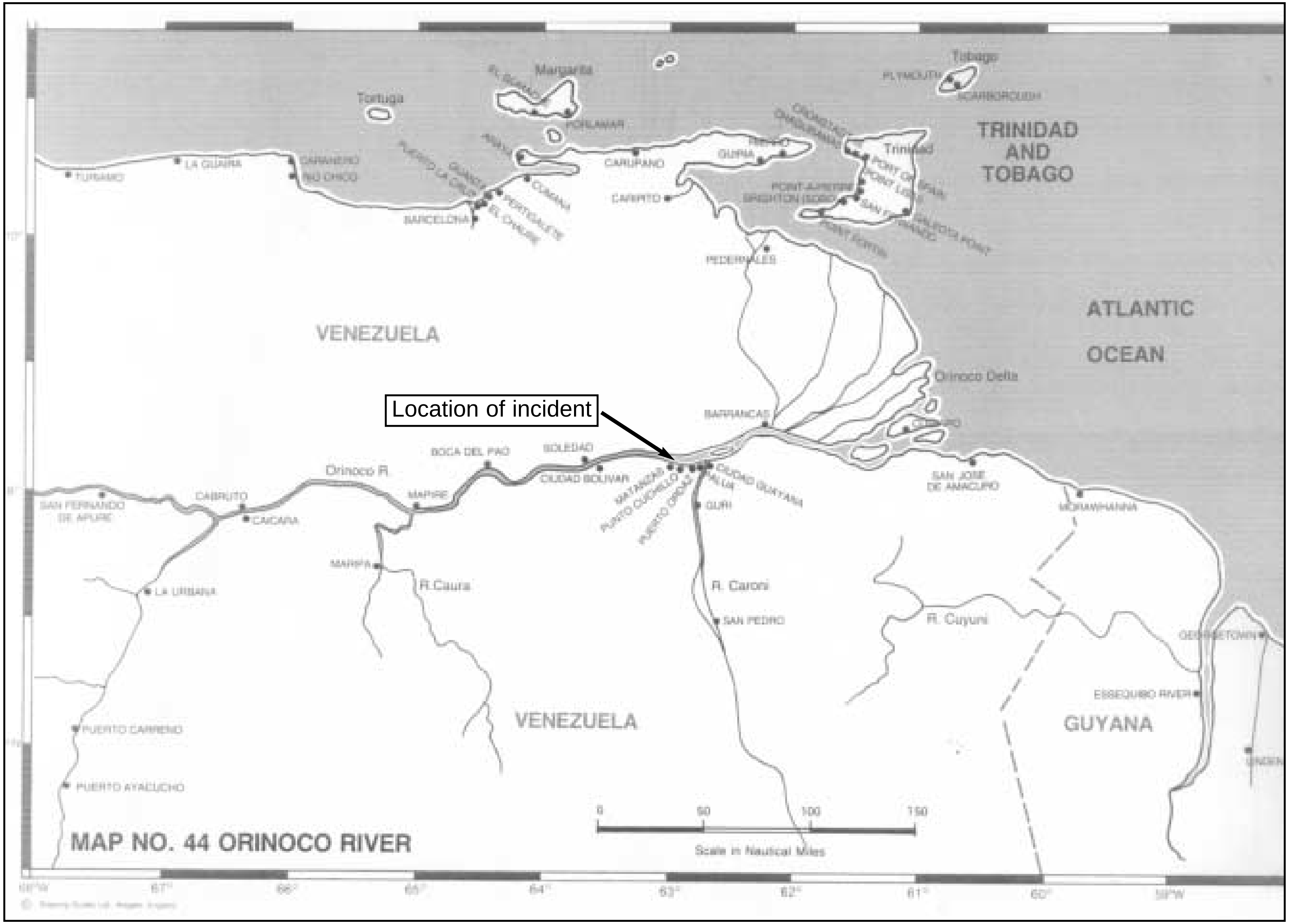
Regulations 1999

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the cause with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

CONTENTS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

gt	-	gross tonnage
ICS	-	International Chamber of Shipping
IMO	-	International Maritime Organization
ITF	-	International Transport Federation
kW	-	kilowatt
MAIB	-	Marine Accident Investigation Branch
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
SOLAS	-	Safety of Life at Sea Convention
UK	-	United Kingdom
USA	-	United States of America
UTC	-	Universal Co-ordinated Time


Location of incident
MAP NO. 44 ORINOCO RIVER
VENEZUELA
VENEZUELA
GUYANA
TRINIDAD AND TOBAGO
ATLANTIC OCEAN
Margarita
Tortuga
Tobago
Trinidad
Orinoco Delta
Orinoco R.
R. Caura
R. Caroni
R. Cuyuni
BOCA DEL PAO
SOLEDAD
CIUDAD BOLIVAR
MAPIRE
CABRUTO
CAICARA
SAN FERNANDO DE APURE
LA URBANA
PUERTO CARRENO
PUERTO AYACUCHO
MARIPA
BARRANCAS
PEDERNALES
CARUPANO
CARIPITO
CUMANA
BARCELONA
LA GUAIRA
CIUDAD GUAYANA
MATANZAS
PUERTO ORDAZ
GURI
SAN PEDRO
SAN JOSE DE AMACURO
MORAWHANNA
GEORGETOWN
ESSEQUIBO RIVER
0 50 100 150
Scale in Nautical Miles

SYNOPSIS

At 0829 local time (UTC-4) on 2 August 2000, *Global Mariner*, a 12,778gt United Kingdom-registered dry cargo vessel, was in collision with *Atlantic Crusader*, a 7,366gt Cyprus-registered container vessel, and then foundered at Matanzas, Orinoco River, Venezuela.

Northern Marine Management Ltd reported the accident to the Marine Accident Investigation Branch (MAIB), and an investigation started that day.

Atlantic Crusader, a Cyprus-registered general cargo vessel of 7,366gt, had anchored originally downstream of the Matanzas quay. However, after dragging her anchor a number of times, her master had sought better holding ground and had reanchored his vessel further upstream. She had then dragged her anchor on three further occasions, most recently at 0506 that day.

Global Mariner had berthed heading upstream alongside the Matanzas quay. She sailed from Berth No 3 at 0818 with an even keel draught of 9.9 metres and, with the assistance of two tugs, turned around to head downstream. In addition to the manoeuvring pilot and the master, the bridge was manned by the chief officer, a cadet and a helmsman. Two other vessels, *Illapel* and *Atlantic Crusader*, were anchored in the river, both heading upstream, with the latter lying astern of the former. Almost immediately, there appeared to be a risk of collision with *Atlantic Crusader*, which was showing a starboard aspect at approximately 4 cables on the port bow from *Global Mariner*. She was perceived to be underway and proceeding on a course across the track of *Global Mariner*.

Subsequently, with the master's agreement, the pilot ordered hard to starboard and the forward tug was then released. At approximately 0829, *Atlantic Crusader*'s bow impacted with the port side of *Global Mariner* in way of No 2 hold. The resultant damage to *Global Mariner* caused her to flood and founder, finally grounding on the south side of the river. There were no injuries and all on board were safely evacuated.

Neither vessel was fitted, nor required to be fitted, with a voyage data recorder and there is conflicting evidence with respect to the collision position and the circumstances leading up to the accident; it is uncertain whether or not *Atlantic Crusader* had started to drag her anchor before the collision. In view of the uncertainty, no definitive causes have been identified and no attempt has been made in this report to suggest a most probable scenario.

The analysis focuses primarily on the actions of those on board, and factors immediately affecting *Global Mariner*. It is expected that the Venezuelan and Cypriot authorities will, as a result of their separate investigations, focus on any additional and underlying matters affecting respectively the port authority and *Atlantic Crusader*.

The following are considered to be relevant factors:

- Before departure, those on board *Global Mariner* believed that *Atlantic Crusader* was securely anchored to the north of the pilot's intended track, and would remain so until *Global Mariner* was past and clear.

- *Atlantic Crusader*'s unexpected relative position and aspect, caused by yaw or her anchor dragging, led those on board *Global Mariner*, and other eyewitnesses, to believe she was underway and proceeding on a course across the track of *Global Mariner*.

- The strength and direction of the current significantly reduced the time available in which to take effective avoiding action.

- *Global Mariner*'s master and manoeuvring pilot required time to assess the unusual, unexpected and confusing situation, and decide on the avoiding action to be taken.

Recommendations addressed to the Venezuelan authorities are aimed at preventing a similar accident in the future.

The MAIB wishes to express its gratitude to all contributing parties to this investigation, including the Venezuelan and Cypriot authorities, for their co-operation and assistance.

Photograph courtesy of Northern Marine Management Ltd

Global Mariner

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *GLOBAL MARINER* AND ACCIDENT

Vessel details

Registered Owner	:	ITF World Expo Ltd
Bareboat Charterer	:	Global Mariner Ltd
Manager	:	Northern Marine Management Ltd
Port of registry	:	London
Flag	:	United Kingdom
Type	:	Dry cargo vessel
Built	:	1979, Sunderland, United Kingdom
Classification society	:	Lloyd's Register of Shipping
Construction	:	Steel
Length overall	:	161.83 metres
Gross tonnage	:	12,778
Engine power and type	:	8,827kW, Doxford
Service speed	:	16.5 knots
Certification	:	All statutory certificates valid

Accident details

Time and date	:	About 0829 (UTC-4), 2 August 2000
Location of incident	:	Latitude 08°18'N, Longitude 062°50'W, Matanzas, Orinoco River, Venezuela
Persons on board	:	32
Injuries	:	None
Damage	:	Vessel lost

1.2 BACKGROUND

All times are local (UTC-4). All headings are true.

1.2.1 *Global Mariner*

During the few years preceding the accident, the United Kingdom government provided financial assistance to the UK marine industry in an attempt to increase cadet recruitment. The initiative was partly successful. However, there was a shortage of sea-going accommodation for cadets, and it was to address this shortfall that Clyde Marine Training suggested to the International Transport Federation (ITF) that its vessel, *Global Mariner*, be converted into a cadet training vessel.

The project became a reality at the end of April 2000. A new company, Global Mariner Ltd, was formed, and this entity then chartered the vessel. Northern Marine Management and ASP Seascot were appointed as shipmanager and commercial manager respectively. The vessel was delivered to Global Mariner Ltd at the end of April 2000 and started to trade commercially.

Global Mariner's first cargo of general and steel products was loaded in Hamburg, La Coruna, Gijon and Bilbao under time charter to SOL Chartering Bremen. Her discharge ports were San Juan, Vera Cruz and Tampico. She was redelivered from the charter on 1 June, and then proceeded in ballast to Venezuela to load in the Orinoco River on time charter to Conti Lines USA. A full cargo of steel was loaded at Matanzas and discharged at Vera Cruz and Tampico.

Global Mariner then returned in ballast to Matanzas to take a voyage charter cargo of steel products for discharge at Costa Rica and Guatemala. She berthed heading upstream and remained port side alongside for 13 days, before departing on 2 August 2000.

1.2.2 *Atlantic Crusader*

Atlantic Crusader, a Cyprus-registered general cargo vessel of 7,366gt, anchored in position Latitude 08°18.35'N, Longitude 062°49.8'W, downstream of the Matanzas quay, at 0930 on 29 July 2000 using her starboard anchor. There is conflicting evidence as to whether the vessel was anchored with 5 shackles of cable on deck or 6 shackles in the water.

Early in the evening of 30 July, the vessel experienced sudden heavy rain and a strong wind, which caused her to drag her anchor. Her port anchor was let go but then both anchors were recovered and she was reportedly reanchored in the same position using her starboard anchor with 5 shackles of cable in the water.

At 0930 on 31 July, *Atlantic Crusader* was again observed to be dragging her anchor. Her starboard anchor was recovered at 1000, let go at 1010, heaved at 1020, let go at 1040, and is reported to have been let go again at 1124. At 1430, the vessel was observed to be dragging her anchor once more. The starboard anchor was recovered at 1455 and then let go at 1505, and again at 1542 with 5 shackles of cable in the water. The port anchor was let go at 1553 with 2 shackles of cable.

During 31 July, the master is reported to have been advised by his agent that he was permitted to reanchor without an official pilot if there was no other traffic in the area. However, he was subsequently fined by the Venezuelan authorities for doing so.

At 1015 on 1 August, *Atlantic Crusader* was again observed to be dragging her anchor. Both anchors were recovered and the master sought better holding ground. At 1210, he reanchored his vessel further upstream in position Latitude 08°17.7'N, Longitude 062°50.48'W using the starboard anchor and 6 shackles of cable in the water. At 1336, the port anchor was let go with 3 shackles of cable on deck in an attempt to reduce yaw.

At 2247, *Atlantic Crusader* was again observed to be dragging her anchor. Both anchors were recovered and, at 2329, the vessel was reanchored in a similar position using her starboard anchor and 6 shackles of cable in the water. She dragged her anchor again at 0140 on 2 August and, at 0226, the starboard anchor was let go, this time with five and a half shackles of cable in the water, and again in a similar position.

At 0506, *Atlantic Crusader* again dragged her anchor and, at 0536, was reanchored in a reportedly similar position with her starboard anchor and five and a half shackles in the water.

1.2.3 Matanzas

Matanzas lies close to Puerto Ordaz on the south bank of the Orinoco River, Venezuela. The river is marked by light-beacons and light-buoys, which are numbered on the chart with their distance in miles from the river channel entrance. Matanzas is at Mile 195. The river transit is conducted under pilotage, and the vessel's position is required to be reported hourly by radio to Puerto Ordaz.

The river reaches its greatest height in late August, and its lowest height generally each March. At high river, there is no tidal influence at Matanzas. However, the rate of the current is significant and, dependent upon river width, shape and bottom gradient, can be as great as 6 knots.

A feature of the river is that the bottom generally consists of a layer of very soft mud and sand, virtually in suspension and partly mobile. This makes calculation of the actual depth of water in the channel difficult using an echo sounder. Reports of groundings are common, and are attributed to continuous silting of the dredged channels. In addition, the channel buoyage is reported to be unreliable.

The following is an extract from the United Kingdom *Admiralty Sailing Directions South America Pilot Volume IV (NP7A)*, a copy of which was carried on board *Global Mariner*:

> *Reports of groundings have increased in recent years (1984-6); these are attributed to continuous silting of the dredged channels. In addition, ships' reports indicate that the channel buoyage is unreliable. Vessels running aground usually suffer no damage, except in the vicinity of mile 105… However, the cost of tugs, which have to come from Puerto Ordaz, is excessively high. In addition vessels running aground at the beginning of the low river season (December to May) may encounter further difficulties.*

The Orinoco Channel Management issues daily bulletins in respect of maximum authorised draught and status of channel marks. On 2 August 2000, the authorised draught was reported to be 35 feet 5 inches (10.79 metres) and the following buoys in the region of Matanzas were reported to be outside the dredged channel: 189.9, 190.4 and 190.9. This information was not provided to *Global Mariner*'s master before departure.

The manoeuvring pilot is relieved off the port by a river pilot. Pilotage is compulsory.

The quay at Matanzas is 1,038 metres long, providing six berths, and is used for discharging raw materials and loading steel products. Vessels of up to 30,000 tonnes deadweight and 182 metres in length, drawing up to 13.10 metres during the rainy season and 10.06 metres during the dry season, can be accommodated. In 1997, the port was used by 246 vessels with a total deadweight of 4,785,816 tonnes.

The charted designated anchorage for vessels waiting to berth is nearly 1 mile downstream from Matanzas, although vessels are regularly anchored between Miles 193 and 196. On anchoring, vessels are required to notify Puerto Ordaz radio station.

Tugs are available and their use is compulsory.

1.3 NARRATIVE (see Figure 1)

At 2000 on 1 August, *Global Mariner*'s master expected cargo operations to be completed by 2300. However, he was later advised that cargo loading and securing would be completed at 0200 and 0500 respectively. At midnight, he instructed the second officer to call him in the morning when the agent was on board.

The second officer called the master at 0500, informing him that the agent had arrived. Although some documentation was completed by 0515, cargo quality statements from the P&I club representative were still awaited. A manoeuvring pilot and two river pilots boarded at 0530, which was the scheduled departure time. However, documentation was not completed until 0745.

The master then went to the bridge. The three pilots were on the port wing. The third officer had completed checking the bridge equipment at 0645. A pilot card was on the chart table. British Admiralty and some local Venezuelan charts were to hand. There is conflicting evidence as to whether or not courselines had been plotted on any of the charts in use, and it is uncertain the extent to which the passage plan made specific reference to turning the vessel around before heading downstream. The engine was then tested and, at 0800, stand-by was rung on the telegraph.

The master told the pilots that the vessel had a conventional right-handed propeller. The manoeuvring pilot, who spoke in English, asked if the master had sailed from Matanzas before, to which the latter confirmed that he had. The manoeuvring pilot then confirmed that the turn off the berth would be the same as that previously carried out. The bridge was manned additionally by the chief officer, a cadet and a helmsman. Before letting go, the master checked that the starboard side was clear of local craft, and that the river was clear of traffic. At the same time, both he and the manoeuvring pilot noted that two vessels, *Illapel* and *Atlantic Crusader*, were anchored in the river, both heading upstream, with the latter lying astern of the former. The positions of the anchored vessels were not fixed on the chart.

Global Mariner sailed from berth No 3 at 0818 with an even keel draught of 9.9 metres.

Two tugs assisted the departure; one was secured forward on the starboard side using the tug's line, while the other stood by aft. The third and second officers were in charge of the forward and after mooring parties respectively.

On letting go, the engine was put to dead slow ahead and the helm hard to port, while the forward tug pulled the bow off the quay. Once clear of the vessel berthed directly ahead of *Global Mariner*, the helm was reversed and the after tug started to push on the starboard quarter to help turn the vessel around to head downstream. During the turn, the engine was put to half ahead at 0823,

and then full ahead at 0824. *Illapel* was anchored in the river directly opposite berth No 3. She had been anchored for several days and was due to take *Global Mariner*'s berth. *Global Mariner* completed the turn satisfactorily, and at no time approached closer than about 200 metres from *Illapel*, which was then abaft the port beam. One of the two river pilots then went below.

Global Mariner proceeded downstream with the manoeuvring pilot's helm orders being relayed by the chief officer to the helmsman. No courses were ordered. The cadet operated the telegraph to the master's orders and recorded the engine movements. Almost immediately, there appeared to be a risk of collision with *Atlantic Crusader*, which was showing a starboard aspect at approximately 4 cables on the port bow. She was perceived to be underway and proceeding on a course across the track of *Global Mariner* with her port anchor a-cockbill; no anchor ball was seen.

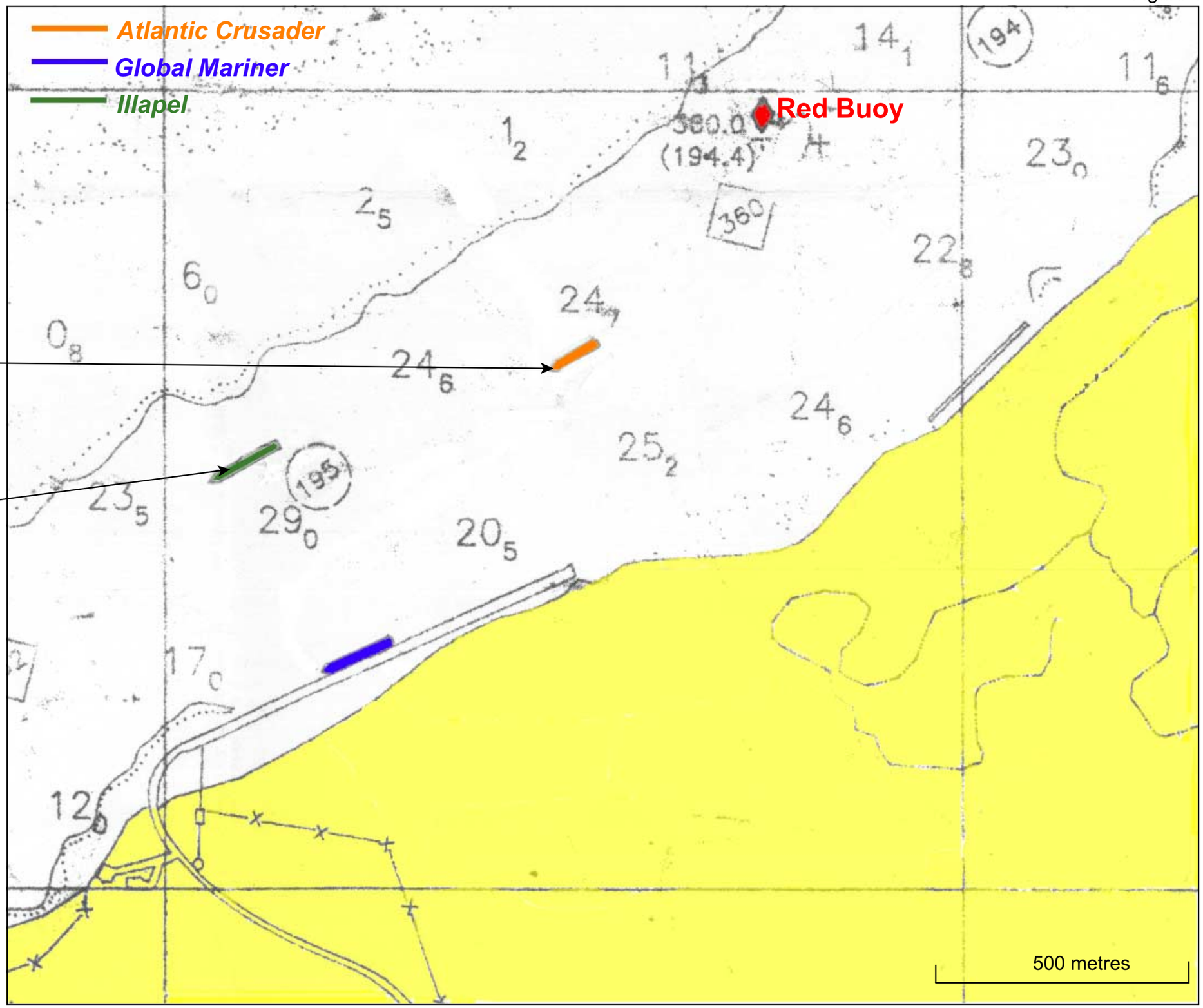
At the request of the manoeuvring pilot, the river pilot called *Atlantic Crusader* on VHF radio and requested she alter course to starboard so that the vessels would pass port to port. *Atlantic Crusader*'s watch officer and master both replied to the effect that their vessel was at anchor and stopped; it is unknown if their replies were received on board *Global Mariner*. The third officer informed the bridge that *Atlantic Crusader* appeared to be manoeuvring. The master asked the manoeuvring pilot if he had expected any traffic movements, to which he replied that he had not. The pilot then asked the master if he could see the red buoy towards the north side of the channel. The master was unable to see it at first, but then sighted it opening from the stern of *Atlantic Crusader*.

The pilot advised the master that the water was too shallow for a turn to port, and the master was reluctant to alter course to port in case *Atlantic Crusader* altered her course to starboard. With the master's agreement, the pilot ordered hard to starboard. The vessel's speed through the water at this time was estimated at between 3 and 5 knots. The forward tug was then released at the request of the pilot. The master thought that, by remaining, the tug might hinder the manoeuvre. At about 0827, the master ordered stop and then full astern, quickly followed by full ahead. At the same time, both he and the manoeuvring pilot ordered hard to port in an attempt to reduce the angle of impact. The master sounded the general alarm and ordered stop.

At approximately 0829, the vessels collided with the port side of *Global Mariner* in way of No 2 hold coming into contact with *Atlantic Crusader*'s bow.

The master then moved to the port wing, and saw *Atlantic Crusader*'s starboard anchor cable leading abeam on a short stay. A mixture of air and spray was seen emitting from No 1 and 2 hold vents; *Global Mariner* quickly trimmed by the head. She then turned to port and drifted downstream **(Figure 2)**.

Figure 1



Atlantic Crusader's recorded anchorage position

Estimated position of *Illapel*

Enlarged extract from local Venezuelan chart

Photograph courtesy of Captain A H van Omme

Figure 2

Photograph taken from a vessel alongside the Venalum quay

The chief officer telephoned the engine room, reported the situation, and requested that No 1 and 2 hold bilges be pumped out. The master told the chief engineer to evacuate all non-essential personnel from the engine room. He also told the third officer to remain forward for anchoring, but to send the rest of his mooring party aft. The chief officer instructed the second officer to evacuate the accommodation and to prepare the lifeboats.

Photograph courtesy of P. J. Monque B. Figure 3

Flooding of *Global Mariner* following the collision

After clearing *Atlantic Crusader*, the master ordered full ahead and hard to starboard with the intention of beaching *Global Mariner* to the east of the Venalum terminal on the south side of the river. However, he then ordered port helm on the advice of the manoeuvring pilot that the river bottom in that area was rock. The main engine then stopped. The chief engineer told the master that the main engine had lost lubricating oil due to the vessel's head trim, to which the master instructed him to evacuate the engine room.

Meanwhile, the lifeboats had been lowered to embarkation level, and the crew were mustering with their lifejackets. The pilots took lifejackets from the bridge and proceeded to the poop deck. The main deck became flooded, leaving the third officer stranded, until he was rescued by a pilot launch. The helmsman fetched a lifejacket from his cabin; while returning to the bridge, he was washed

overboard and was recovered eventually from the water by a small boat. The pilot launch proceeded aft and successfully rescued the remaining crew from the poop deck; the trim had rendered the lifeboats unusable.

Global Mariner finally grounded on the south side of the river in position Latitude 08°18.2'N, Longitude 062°49.7'W.

Photograph courtesy of P. J. Monque B. Figure 4

Global Mariner aground following the accident

After the collision, *Atlantic Crusader* dragged her anchor towards the Venalum quay, and it is possible that she had already started to drag before the collision. Her engine was started and she reanchored at 0911. The recorded collision position on board *Atlantic Crusader* was the east end of Matanzas quay bearing 180° at 0.24 mile range. However, eyewitness evidence suggests the bearing and range were more in the order of 215° and 600 metres at the time of the collision.

1.4 DAMAGE

1.4.1 *Global Mariner*

Atlantic Crusader's bulbous bow penetrated *Global Mariner*'s hull on the port side, in way of the bulkhead between No 2 and 2A holds and, in her nearly fully loaded condition, the resulting damage to *Global Mariner* was sufficient to cause her to flood rapidly and founder.

Global Mariner had previously been used as an exhibition ship, during which time she had had to comply in port with specified damage stability requirements. However, on completion of her exhibition role, various stairways and doors fitted in her holds were removed, and doors set in hold bulkheads were welded up to the satisfaction of her classification society.

Operating as a dry cargo vessel built in 1979, *Global Mariner* was not required to comply with any subdivision or damage stability criteria.

The UK *Merchant Shipping (Cargo Ship Construction) Regulations 1997*, as amended by the UK *Merchant Shipping (Cargo Ship Construction) (Amendment) Regulations 1999*, introduced requirements for subdivision and damage stability of cargo ships 100 metres in length and upwards built after 1 February 1992, and cargo ships 80 metres in length and upwards built after 1 July 1998.

Photograph courtesy of Brookes Bell Jarrett Kirman Figure 5

Cut section showing bulb penetration and bulkhead between No 2 and 2a holds

1.4.2 *Atlantic Crusader*

Atlantic Crusader's stem was penetrated in way of her forecastle store as a result of contact with the port side deck edge of *Global Mariner*. She incurred no apparent damage to her bulbous bow or other underwater areas.

Figure 6

Damage to stem of *Atlantic Crusader*

Figure 7

Bulbous bow of *Atlantic Crusader* after the incident

1.5 THE CREW

Global Mariner carried 32 people, including nine cadets.

The master was British and held a class 1 certificate of competency issued in 1989. He had served as master in foreign-going vessels since 1993, and joined *Global Mariner* at the end of April 2000.

While the vessel was alongside at Matanzas, he worked during the day and, except for the evening immediately preceding the accident, was able to get a full night's sleep. During the 24 hours before the accident, he slept in a chair for about 2 hours during the afternoon, and in bed for about 5 hours between midnight and 0500. He was not taking any form of medication or other drug, and had not consumed alcohol for at least 2 days. When he awoke at 0500 on 2 August, he felt fine.

The chief officer obtained a first mate's certificate of competency (Class 2) in 1969. He had since served as chief officer with a number of companies, and first joined *Global Mariner* in July 1998. He joined the vessel most recently on 7 January 2000 after one month's leave.

Northern Marine Management had a training matrix in place for all crew members and, although not mandatory, this included bridge team management training courses for masters and senior officers with a refresher interval of 5 years. Although it was intended for them to do so, it had not yet been practicable for the master or chief officer to attend the course.

1.6 THE MANOEUVRING PILOT

The manoeuvring pilot began seafaring in 1963. He had held a chief mate's licence since 1973 and had been an Orinoco River pilot for 25 years, 10 of which were as a manoeuvring pilot, 3 years at Puerto Ordaz and 7 years at Matanzas.

The manoeuvring pilot was aware that neither *Atlantic Crusader* nor *Illapel* were scheduled to manoeuvre before *Global Mariner* was clear and navigating downriver, and also that neither vessel had a pilot on board. However, he was unaware that *Atlantic Crusader* had been dragging her anchor intermittently since her arrival on 29 July.

1.7 SUBSEQUENT ACTION TAKEN BY THE PORT AUTHORITY

On 18 August 2000, the port authority issued a memorandum to its navigation and manoeuvring pilots, ordering that with immediate effect, all vessels anchoring within its jurisdiction must do so with two anchors in an appropriate depth for the vessel's draught and where the current has least effect. Subsequently, it requested the appropriate national authority to mark the anchorage areas with white buoys.

SECTION 2 - ANALYSIS

2.1 AIM

The purpose of the analysis is to determine relevant factors and safety issues arising from the accident as a basis for making recommendations, if any, with the aim of preventing similar accidents occurring in the future.

There is conflict between *Atlantic Crusader*'s recorded anchorage position, her recorded collision position, and the collision position generally estimated by eyewitnesses. It is possible that the collision caused *Atlantic Crusader* to move from her anchorage position. Alternatively, she could have already started to drag her anchor before the collision, which is plausible given the frequency with which she had previously dragged her anchor, and had continued to do so in her revised anchorage position. Eyewitness accounts support the latter.

In view of the uncertainty, a number of scenarios are possible. However, no attempt has been made in this report to suggest a most probable scenario.

The analysis focuses primarily on the actions of those on board, and factors immediately affecting *Global Mariner.* It is expected that the Venezuelan and Cypriot authorities will, as a result of their separate investigations, focus on any additional and underlying matters affecting respectively the port authority and *Atlantic Crusader*.

2.2 PREPARATION AND MONITORING

2.2.1 Background **(Figure 8)**

A key factor to the collision was *Global Mariner*'s crew being unprepared for *Atlantic Crusader*'s relative position and aspect immediately following *Global Mariner*'s turn downstream. Instead of being to the north of the vessel's track and heading upstream, *Atlantic Crusader* appeared to be crossing *Global Mariner*'s track and heading towards the Matanzas quay.

Atlantic Crusader was at anchor, and had been so since 0536 that day. Her master had sought better holding ground and had anchored further upstream in an attempt to prevent the vessel dragging her anchor. Although fundamentally heading upstream, *Atlantic Crusader* was influenced by the current, which caused her to yaw. This was common to vessels anchored off Matanzas. However, the extent of her yaw and her precise anchorage position at 0536 are uncertain.

If *Atlantic Crusader* had been securely anchored towards the north side of the channel, in accordance with the normal practice, and *Global Mariner*'s track had been parallel to Matanzas quay and towards the south side of the channel, *Atlantic Crusader*'s starboard aspect would probably have attracted minimal attention.

Although *Atlantic Crusader* dragged her anchor immediately following the collision, it is uncertain whether or not she had already started to drag during the period leading up to it, thereby reducing the manoeuvring room available to *Global Mariner*.

2.2.2 Analysis based on an assumption that *Atlantic Crusader* did not drag her anchor before the collision.

Before letting go from her berth, *Global Mariner*'s master and the manoeuvring pilot noted that *Illapel* and *Atlantic Crusader* were anchored in the river, both heading upstream, with the latter vessel lying astern of the former. Without fixing their positions on the chart, it was believed that both vessels were securely anchored to the north of the pilot's intended track, and would remain so until *Global Mariner* was past and clear. However, the pilot's intended heading following the turn was not ascertained.

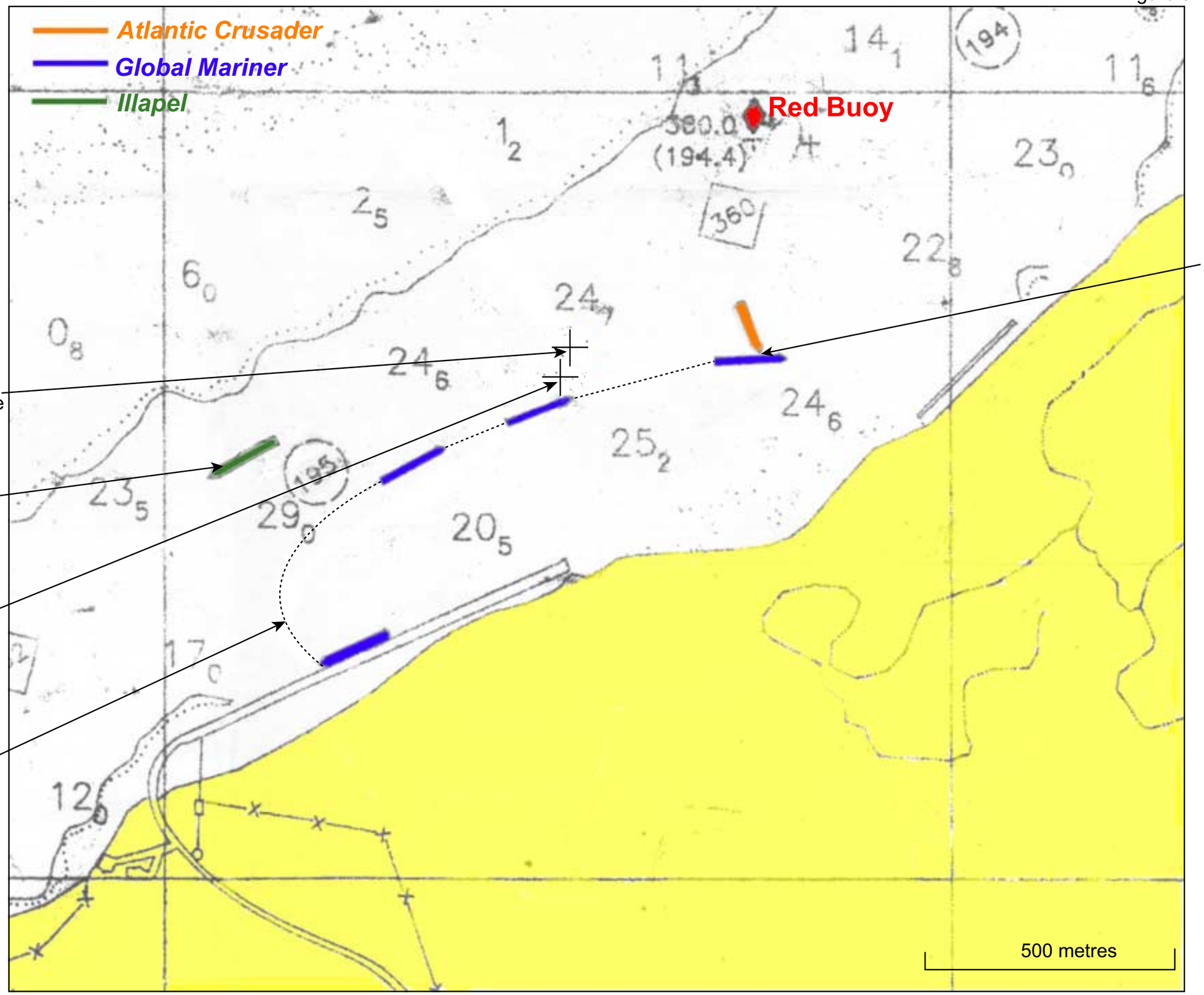
Position fixing of the anchored vessels could have identified that *Atlantic Crusader* was not directly astern of *Illapel,* but further towards the middle of the channel. With knowledge of *Atlantic Crusader*'s exact position and the pilot's intended track, the bridge team would have had the opportunity of assessing the implications of the intended turning manoeuvre, and of introducing appropriate amendments to the plan.

Although vessels are required to notify Puerto Ordaz radio station on anchoring, there is no requirement for them to report the exact position. *Atlantic Crusader*'s master had not reported his latest anchorage position, nor the fact that he had again reanchored, because he had reportedly been advised previously by his agent that he was permitted to reanchor without an official pilot, if there was no other river traffic in the area.

Northern Marine Management's company rules required a passage plan to be prepared to the master's satisfaction before sailing. They also warned officers against being lulled into a false sense of security, especially in pilotage and coastal waters, restricted visibility and at night. The rules also referred to the advice contained in the International Chamber of Shipping's *Bridge Procedures Guide*, which was to some extent reflected in *A Guide for Maritime Traffic Safety in the Orinoco River*, although this latter publication was not carried, nor required to be carried, on board.

It is uncertain whether or not courselines were plotted on any of the working charts in use on board *Global Mariner*. If not, this was probably due, at least in part, to the relatively small scale of the charts, the meandering nature of the river requiring frequent course alterations, and the variable width of the navigable channel. Additionally, the reported frequency of groundings and unreliability of buoyage, probably adversely affected confidence in the accuracy of the working charts in use. However, some indication of the intended track would have been useful in identifying any obvious and immediate dangers, and any unexpected deviation from the intended track experienced during the

Figure 8



Enlarged extract from local Venezuelan chart

execution of the passage. This would have accorded with the advice provided in the *Bridge Procedures Guide* and would have encouraged continuous position monitoring in accordance with the company rules. If no courselines were plotted on the working charts, the bridge team was not in a position to confirm whether or not the pilot's choice of heading was appropriate.

The overall effect of the above was for the bridge team to place unnecessary reliance on the manoeuvring pilot for the vessel's safe navigation, contrary to the warning provided in the company rules.

As promulgated in the *Bridge Procedures Guide*, an effective bridge organisation should ensure the bridge is adequately manned, and should promote good communication and teamwork. A comprehensive passage plan, agreed by all parties at the outset, is a sound basis for effective bridge teamwork, which is necessary to eliminate the risk that an error by one person could result in a dangerous situation. Had accurate positions of the anchored vessels been ascertained and fixed on the chart, and the intended manoeuvre, including the pilot's intended track, been discussed in detail and agreed by the bridge team, it is possible that any danger posed by *Atlantic Crusader*'s position could have been recognised, enabling the plan to be adjusted as necessary.

Although the master exchanged some basic information with, and then monitored closely the actions of, the manoeuvring pilot, he did not receive close navigational support from the chief officer, who was the only other officer present on the bridge. Visual and radar observation of the anchored vessels, and close monitoring of *Global Mariner*'s heading and projected track, throughout the turning manoeuvre would have enabled the master and the manoeuvring pilot to have been updated continuously on the current situation and to have been alerted immediately to anything untoward.

2.2.3 Analysis based on an assumption that *Atlantic Crusader* dragged her anchor before the collision and after *Global Mariner* left her berth.

Atlantic Crusader's anchorage position is uncertain. Hence, the extent to which she dragged her anchor before the collision is also uncertain.

The issues discussed in section 2.2.2 remain valid. However, this scenario raises some additional points.

Neither *Atlantic Crusader*'s watch officer nor her master was aware of the vessel dragging her anchor before the collision, which would indicate that an inadequate anchor watch was being maintained.

Close monitoring by *Global Mariner*'s bridge team of *Atlantic Crusader*'s position and aspect throughout the turn could have identified at an earlier stage that she was dragging her anchor. However, without knowledge of the difficulties *Atlantic Crusader* had previously experienced in maintaining position, they were not alerted specifically to the possibility of her dragging her anchor again.

2.3 COLLISION AVOIDANCE

On completion of the turn, there appeared to be a risk of collision with *Atlantic Crusader*. The precise heading of *Global Mariner* at that time is unknown. However, *Atlantic Crusader* was showing a starboard aspect at approximately 4 cables on the port bow.

Although at anchor, *Atlantic Crusader* was perceived to be underway and proceeding on a course across the track of *Global Mariner*. This was probably because she was towards the middle of the channel and heading towards Matanzas quay with her port anchor a-cockbill. This initial perception did not go unquestioned, but probably strongly influenced the rejection of any alternative explanation for her position and heading.

At the request of the manoeuvring pilot, the river pilot called *Atlantic Crusader* on VHF radio and requested she alter course to starboard so that the vessels would pass port to port. It is unknown if a reply was received from *Atlantic Crusader*. In any event, the bridge team's attention was focused on what action should be taken to avoid a collision, assuming that *Atlantic Crusader* was indeed underway and crossing from port to starboard. So strong was the perception, that no attempt was made to use the available binoculars to establish whether the starboard anchor was deployed, or if the anchor ball was displayed forward; it might have been difficult to see either without assistance. However, if *Atlantic Crusader* had, in fact, been dragging her anchor before the collision, sighting of the anchor ball or starboard anchor cable alone would have given no indication of her movement.

The bridge team's perception was then reinforced by the third officer's statement that *Atlantic Crusader* appeared to be manoeuvring. In the absence of definitive evidence to indicate that *Atlantic Crusader* was, in fact, manoeuvring, it is possible that she gave that appearance owing to turbulence at her bow and stern, because of the direction and strength of the current in relation to her unexpected heading.

This was an unusual, unexpected and confusing situation, which left little time to react. In view of the immediacy of the risk of collision, both the master and the manoeuvring pilot were probably experiencing increased levels of stress, which would have potentially affected their situation appraisal and decision-making ability. Consideration was given to the possibility of altering course to port, and valuable time was spent in attempting to identify the red buoy towards the north side of the river. However, once identified, the option of altering course to port was rejected by the pilot, because of insufficient water depth, and by the master, because of the possibility of *Atlantic Crusader* altering her course to starboard. Closer navigational support could have provided the master and the manoeuvring pilot with an immediate appraisal of the situation, and could have forewarned them of any danger during the turning manoeuvre.

On the assumption that both vessels were underway and crossing so as to involve a risk of collision, Rule 15 of the *Collision Regulations* was relevant, in that *Atlantic Crusader* was required to keep out of the way. However, in accordance with Rule 17(a)(ii), *Global Mariner*'s master was free to take avoiding action as soon as it became apparent that *Atlantic Crusader* was not taking appropriate action in compliance with the Rules. His action in agreeing with the manoeuvring pilot to alter course to starboard was in accordance with the above Rules, and also with Rule 17(c), which prohibits a stand-on vessel to alter course to port in such circumstances.

Rule 30(a)(i) of the *Collision Regulations* requires a vessel at anchor to exhibit a ball in the fore part where it can best be seen. A ball was displayed on *Atlantic Crusader*'s jackstay. However, *Global Mariner*'s crew did not notice it. Assuming it was properly rigged, this might have been, in part, because of the ball's close proximity to the aft side of the jackstay.

Rule 34(d) of the *Collision Regulations* requires a vessel which fails to understand the intentions or actions of another, to indicate immediately such doubt by giving at least five short and rapid blasts on the whistle. No such whistle signal was given on board *Global Mariner*. However, apart from alerting *Atlantic Crusader* to the imminent risk of collision, it is doubtful the giving of such a signal would have affected the outcome in this case. *Atlantic Crusader* could have used a light or sound signal, in accordance with Rule 36 of the *Collision Regulations*, to attract the attention of *Global Mariner.* However, it is again doubtful the giving of such a signal would have affected the outcome in this case.

Instead of attempting to confirm by sight the status of *Atlantic Crusader*, the pilot used VHF radio to request a port to port passing. The UK MCA's Marine Guidance Note MGN 167 (M+F) warns against the use of VHF radio in collision avoidance. It points out, as in this case, that valuable time can be wasted in trying to make contact instead of complying with the *Collision Regulations*.

Having altered course to starboard, the manoeuvring pilot and the master agreed to let go the forward tug because the master thought, by remaining, the tug might hinder the manoeuvre. *Atlantic Crusader* was at anchor and, therefore, apart from yawing, was not influenced by the current, except to the extent caused by any dragging. The availability of tugs, particularly if they had been secured to *Global Mariner*, might have enabled her to be manoeuvred clear when it became apparent to the bridge team that a collision was otherwise inevitable.

Although the master placed unnecessary reliance on the manoeuvring pilot for the vessel's safe navigation during the preparation and execution of the turn, he promptly and positively intervened when faced with the unexpected situation.

However, by not requiring, from the outset, closer navigational support from the chief officer, the master denied himself the possibility of valuable assistance when the situation called for immediate and decisive action.

Northern Marine Management‘s company rules require the watchkeeping officer to continue his duties and give the master every assistance. The chief officer could have voluntarily provided closer navigational support to the master, but only at the expense of reducing what he considered to be an appropriate level of cadet supervision. The consequences of doing so should have been considered at the outset and, if deemed necessary, the resource and management of the bridge team should have been revised. Although not mandatory, neither the master nor the chief officer had received specific bridge teamwork training.

2.4 ANCHORAGE ARRANGEMENTS

Although it was normal practice for vessels to anchor towards the north side of the navigable channel off Matanzas, there was no requirement for them to do so. Any unwritten desire of the port authority to ensure vessels anchored towards the north side of the channel was effected by the pilots, whose services were compulsory for anchoring and weighing anchor. However, in view of the strong current, and the frequency with which *Atlantic Crusader* dragged her anchor, there could be no guarantee that anchored vessels would remain towards the north side of the channel.

The manoeuvring pilot was unaware that *Atlantic Crusader* had dragged her anchor, and there was no specific port authority requirement for vessels to report their exact positions or any problems relating to their ability to maintain position.

Atlantic Crusader was originally anchored in a depth of approximately 25 metres with up to 6 shackles of cable in the water. Although this length would have been more than adequate in relatively calm conditions, it was evidently insufficient to maintain the vessel’s position in the prevailing current and holding ground.

The vessel was equipped with 10 shackles of cable on each anchor. If she had been anchored in unrestricted waters, the master would have been wise to use more cable when it became apparent that the vessel would otherwise drag her anchor. However, given the restricted nature of her original anchorage, more cable would have increased the risk of the vessel entering shoal water when swinging. Alternatively, the master could have used both anchors in the form of an open moor, which would have had the effect of reducing the vessel’s swinging circle, while simultaneously increasing her resistance to dragging. Instead, he opted to seek better holding ground further upstream and, relying on the advice reportedly given by his agent, considered he was entitled to do so. However, had he informed the port authority of his intention, and employed the compulsory services of a pilot, he might have been advised differently.

In view of the frequency with which *Atlantic Crusader* had previously dragged her anchor, and continued to do so in her revised anchorage position, it would have been wise for her master to have used more cable and to have sought the advice of the port authority. Had the port authority been made aware of the difficulties she had previously experienced in maintaining position, *Global Mariner'*s manoeuvring pilot, and thereby her master, could have been alerted specifically to the possibility of her dragging anchor again.

SECTION 3 - CONCLUSIONS

Neither *Global Mariner* nor *Atlantic Crusader* was fitted, nor required to be fitted, with a voyage data recorder and there is conflicting evidence with respect to the collision position and the circumstances leading up to the accident; it is uncertain whether or not *Atlantic Crusader* had started to drag her anchor before the collision. In view of the uncertainty, no definitive causes have been identified and no attempt has been made in this report to suggest a most probable scenario. However, a number of factors, which focus primarily on the actions of those on board *Global Mariner*, are relevant in considering how a similar accident could be prevented in the future.

It is expected that the Venezuelan and Cypriot authorities will, as a result of their separate investigations, focus on any additional and underlying matters affecting respectively the port authority and *Atlantic Crusader*.

3.1 RELEVANT FACTORS AND SAFETY ISSUES

1. Before departure, those on board *Global Mariner* believed that *Atlantic Crusader* was securely anchored to the north of the pilot's intended track, and would remain so until *Global Mariner* was past and clear.

- The positions of *Illapel* and *Atlantic Crusader* were not fixed on the chart. [2.2.2]

- Before departure, the bridge team did not ascertain the pilot's intended heading following the turn. [2.2.2]

- It is uncertain whether or not courselines were plotted on any of the working charts. If not, the bridge team was not in a position to confirm whether or not the pilot's choice of heading was appropriate. [2.2.2]

- The reported frequency of groundings, and unreliability of buoyage, probably adversely affected confidence in the accuracy of the working charts in use. [2.2.2]

- *Atlantic Crusader*'s position and frequency of dragging were not known to *Global Mariner*'s manoeuvring pilot and bridge team. [2.2.2, 2.2.3]

- Had the port authority been made aware of the difficulties *Atlantic Crusader* had previously experienced in maintaining position, *Global Mariner*'s manoeuvring pilot, and thereby the master, could have been alerted specifically to the possibility of her dragging anchor again. [2.4]

- There was no specific port authority requirement for anchored vessels to report any problems relating to their ability to maintain position. [2.4]

2. *Atlantic Crusader*'s unexpected relative position and aspect, caused by yaw or her anchor dragging, led those on board *Global Mariner,* and other eyewitnesses, to believe she was underway and proceeding on a course across the track of *Global Mariner*.

   - In view of the frequency with which *Atlantic Crusader* had previously dragged her anchor, and continued to do so in her revised anchorage position, it would have been wise for her master to have used more cable and to have sought the advice of the port authority. [2.4]

   - The strong current caused *Atlantic Crusader* to yaw and possibly drag her anchor. [2.2.1]

   - If *Atlantic Crusader* was dragging her anchor before the collision, neither her watch officer nor her master was aware of the fact, which would indicate that an inadequate anchor watch was being maintained. [2.2.3]

   - *Atlantic Crusader*'s port anchor was a-cockbill. [2.3]

   - It might have been difficult to see *Atlantic Crusader*'s starboard anchor cable from *Global Mariner*. [2.3]

   - Assuming it was properly rigged, the position of *Atlantic Crusader*'s anchor ball against the aft side of the jackstay might have rendered it difficult to be seen from *Global Mariner*. [2.3]

   - No attempt was made to use the available binoculars to establish whether *Atlantic Crusader*'s starboard anchor was deployed, or if the anchor ball was displayed forward. However, sighting of the anchor ball, or starboard anchor cable alone, would have given no indication of her possible movement. [2.3]

   - It is possible that turbulence at *Atlantic Crusader*'s bow and stern, because of the direction and strength of the current, gave the appearance that she was manoeuvring. [2.3]

3. The strength and direction of the current significantly reduced the time available in which to take effective avoiding action.

   - With knowledge of *Atlantic Crusader*'s exact position and the pilot's intended track, the bridge team would have had the opportunity of assessing the implications of the intended turning manoeuvre, and of introducing appropriate amendments to the plan. [2.2.2]

   - *Atlantic Crusader* was at anchor and, therefore, apart from yawing, was not influenced by the current, except to the extent caused by any dragging. [2.3]

   - The availability of tugs, particularly if they had been secured to *Global Mariner*, might have enabled her to be manoeuvred clear. [2.3]

4. *Global Mariner*'s master and manoeuvring pilot required time to assess the unusual, unexpected and confusing situation, and to decide on the avoiding action to be taken.

   - The master did not receive close navigational support from the chief officer. [2.2.2]

   - The chief officer could have provided closer navigational support, but only at the expense of reducing what he considered to be an appropriate level of cadet supervision. [2.3]

   - Closer navigational support could have provided the master and manoeuvring pilot with an immediate appraisal of the situation, and could have forewarned them of any danger during the turning manoeuvre. [2.3]

   - Although not mandatory, neither the master nor the chief officer had received specific bridge teamwork training. [2.3]

   - In view of the immediacy of the risk of collision, both the master and the manoeuvring pilot were probably experiencing increased levels of stress, which would have potentially affected their situation appraisal and decision-making ability. [2.3]

SECTION 4 - RECOMMENDATIONS

The Bolivarian Republic of Venezuela is recommended to:

1. Ensure that pilots are fully informed by the port authority of the exact positions of vessels anchored in the Orinoco River, and of any problems relating to their ability to maintain position.

2. Review the current arrangements for anchored vessels in the Orinoco River, and implement any necessary measures to ensure:

   - a sufficiently wide navigable channel remains clear at all times;
   - the risk of vessels dragging their anchors is reduced to a minimum;
   - all vessels report immediately to the port authority their exact positions on anchoring, and any subsequent changes to those positions.

3. Review the reliability of buoyage in the Orinoco River and implement any necessary measures for improvement.

Marine Accident Investigation Branch
November 2002

ANNEX 1 - COMPANY RULES

The following extracts from Northern Marine Management Ltd's company rules are relevant:

1.1 …The Company recognises the existence of publications relating to navigational practices and adopts the following publications which are considered as part of this manual:

1. *IMO "International Standards of Training, Certification and Watchkeeping of Seafarers, 1978 (as amended).*

2. *ICS "Bridge Procedures Guide".*

3. *Merchant Shipping Notices issued by DTp and Flag State Authority.*

4. *IMO "SOLAS" Convention 1974, Chapter 5.*

5. *IMO "International Regulations for Prevention of Collisions" 1972.*

6. *"Mariners Handbook"…*

1.2 …The Master will delegate to his Officers both routine navigational duties and additional duties as the circumstances dictate…

The Master must ensure that a passage plan is prepared to his satisfaction prior to sailing, available to all members of the navigational watch, and properly executed throughout the voyage…

1.3 Danger can arise suddenly and unexpectedly from any quarter at any time. Officers are warned against allowing themselves to be lulled into a false sense of security at any time and especially in pilotage and coastal waters, restricted visibility and at night.

2.1 Reference should be made to:

- *Merchant Shipping Notice No 1102 "Operational Guidance for Officers In Charge of a Navigational Watch".*

Appendix 1 Company Bridge Watchkeeping Standing Orders:

2. *The Watchkeeping Officers must maintain a Navigational Watch strictly in accordance with the IMO "Recommendation on Basic Principles and Operational Guidance Relating to Navigational Watchkeeping" supplemented by the ICS "Bridge Procedures Guide". He shall also give due regard to the Company Rules and the Master's Standing Orders and Night Orders.*

3. *When the Master takes personal charge of the navigation, the Watchkeeping Officer will continue his duties and give the Master every assistance.*

4. *…when manoeuvring in a planned approach, position fixing shall be virtually continuous.*

ANNEX 2 - COLLISION REGULATIONS

The following are extracts from the *International Regulations for Preventing Collisions at Sea 1972*:

Rule 15:

When two power-driven vessels are crossing so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way and shall, if the circumstances of the case admit, avoid crossing ahead of the other vessel.

Rule 17:

(a)(i) Where one of two vessels is to keep out of the way the other shall keep her course and speed.

(ii) The latter vessel may however take action to avoid collision by her manoeuvre alone, as soon as it becomes apparent to her that the vessel required to keep out of the way is not taking appropriate action in compliance with these Rules.

(b) When, from any cause, the vessel required to keep her course and speed finds herself so close that collision cannot be avoided by the action of the give-way vessel alone, she shall take such action as will best aid to avoid collision.

(c) A power-driven vessel which takes action in a crossing situation in accordance with subparagraph (a)(ii) of this Rule to avoid collision with another power-driven vessel shall, if the circumstances of the case admit, not alter course to port for a vessel on her own port side.

Rule 30:

(a) A vessel at anchor shall exhibit where it can best be seen:

(i) in the fore part, an all-round white light or one ball.

Rule 34:

(d) Where vessels in sight of one another are approaching each other and from any cause either vessel fails to understand the intentions or actions of the other, or is in doubt whether sufficient action is being taken by the other to avoid collision, the vessel in doubt shall immediately indicate such doubt by giving at least five short and rapid blasts on the whistle. Such signal may be supplemented by a light signal of at least five short and rapid flashes.

Rule 36:

If necessary to attract the attention of another vessel any vessel may make light or sound signals that cannot be mistaken for any signal authorized elsewhere in these Rules, or may direct the beam of her searchlight in the direction of the danger, in such a way as not to embarass any vessel. Any light to attract the attention of another vessel shall be such that it cannot be mistaken for any aid to navigation. For the purpose of this Rule the use of high intensity intermittent or revolving lights, such as strobe lights, shall be avoided.

ANNEX 3 - PUBLISHED NAVIGATIONAL GUIDANCE

1. Use of VHF radio

The UK Maritime and Coastguard Agency's (MCA) Marine Guidance Note MGN 167 (M+F) (formerly MGN 27 (M+F)), entitled *Dangers in the Use of VHF Radio in Collision Avoidance*, is addressed to shipowners, skippers, officers and pilots of merchant ships, yachts and fishing vessels. The following are extracts:

1. There have been a significant number of collisions where subsequent investigation has found that at some stage before impact, one or both parties were using VHF radio in an attempt to avoid collision. The use of VHF radio in these circumstances is not always helpful and may prove to be dangerous.

3. Valuable time can be wasted whilst mariners on vessels approaching each other try to make contact on VHF radio instead of complying with the Collision Regulations.

5. Although the practice of using VHF radio as a collision avoidance aid may be resorted to on occasion, especially in pilotage waters, the risks described in this Note should be clearly understood and the Collision Regulations complied with.

2. Bridge Teamwork

The following are extracts from the International Chamber of Shipping's *Bridge Procedures Guide* third edition dated 1998:

Introduction- Motivation

A valuable asset in any organisation is teamwork and this is enhanced by recognising the strengths, limitations and competence of the people within a team, and organising the work of the bridge team to take best advantage of the attributes of each team member.

Working in isolation when carrying out critical operations carries the risk of an error going undetected. Working together and sharing information in a professional way enhances the bridge team and the master/pilot relationship. Training in bridge resource management can further support this.

Bridge organisation

General principles of safe manning should be used to establish the levels of manning that are appropriate to any ship.

An effective bridge organisation should efficiently manage all the resources that are available to the bridge and promote good communication and teamwork.

The need to maintain a proper look-out should determine the basic composition of the navigational watch. There are, however, a number of circumstances and conditions that could influence at any time the actual watchkeeping arrangements and bridge manning levels.

Effective bridge resource and team management should eliminate the risk that an error on the part of one person could result in a dangerous situation.

The bridge organisation should be properly supported by a clear navigation policy incorporating shipboard operational procedures, in accordance with the ship's safety management system as required by the ISM Code.

Passage planning

Passage planning is necessary to support the bridge team and ensure that the ship can be navigated safely between ports from berth to berth. The passage plan should cover ocean, coastal and pilotage waters.

The plan may need to be changed during the voyage; for example, the destination port may not have been known or may alter, or it may be necessary to amend the plan following consultation with the pilot.

The passage plan should aim to establish the most favourable route while maintaining appropriate margins of safety and safe passing distances offshore…

…The intended voyage should be planned prior to departure using appropriate and available corrected charts and publications. The master should check that the tracks laid down are safe…

…In addition, the duty of the master to exercise professional judgement in the light of changing circumstances remains a basic requirement for safe navigation.

ANNEX 4 - PORT PROCEDURES

A Guide for Maritime Traffic Safety in the Orinoco River is published annually to supplement official notices and publications issued by Venezuelan government agencies. It was not carried, nor required to be carried, on board *Global Mariner*.

The following extracts are relevant:

- *Masters are reminded to properly plan, discuss and agree with pilots their downriver passage prior to departure from the loading dock. In particular, utilizing their knowledge of their vessel's behaviour at different speeds and response to engine and rudder in restricted waters masters should identify the locations where speed reductions will be called for and the amount required in order to safely negotiate the dredged channels.*

  Finally, masters are reminded that it is the ship's navigational team's responsibility to ensure that these agreed safety precautions are correctly observed by the river pilots.

- *No vessel is allowed to anchor in the narrow channels of the zone, nor close to a turn.*

- *DUTIES OF MASTER*

  1. *To appraise the pilot with characteristics of the vessel's turning abilities, conditions of the engines, stopping distance, steering quality, condition of the equipment, draught, course and speed etc.*

  2. *To maintain proper communication and co-ordination between the pilot and staff.*

  3. *To ensure all the orders given by the pilot are correctly executed*.

  4. *To remain available all the time during piloting.*

- *DUTIES OF PILOT*

  1. To appraise the Master with port conditions especially relating to weather.

  2. *To explain to the Master full procedure of piloting and his requirements.*

  3 *To appraise the Master with regulations and port signals.*

  4. *Exchanging the cards as per latest IMO requirements should preferably do the exchange of information between Master and Pilot.*