Report on the investigation of

the collision between

Lykes Voyager

and ***Washington Senator***

Taiwan Strait

8 April 2005

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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 liability in mind and is not intended to be used in court for the purpose of litigation. It endeavours to identify and analyse the relevant safety issues pertaining to the specific accident, and to make recommendations aimed at preventing similar accidents in the future.

The following is a joint investigation report with the German Federal Bureau of Maritime Casualty Investigation in which the MAIB has taken the lead role pursuant to the IMO Code for the Investigation of Marine Casualties and Incidents (Resolution A.849(20)).

The investigation was conducted in conformity with the law to improve safety of shipping by investigating marine casualties and other incidents (Maritime Safety Investigation Law - SUG) of 24 June 2002.

According to this the sole objective of the investigation is to prevent future accidents and malfunctions. The investigation does not serve to ascertain fault, liability or claims.

The report in hand is a joint investigation report of the Marine Accident Investigation Branch, UK and the Federal Bureau of Maritime Casualty Investigation, Germany. A German version of the investigation report does not exist.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AB	-	Able seaman
AIS	-	Automatic Identification System
AMETIAP	-	Association of Marine Educational and Training Institutes Asia-Pacific Regions
ARPA	-	Automatic Radar Plotting Aid
COLREGS	-	Convention on the International Regulations for Preventing Collisions at Sea, 1972
CPA	-	Closest point of approach
DSC	-	Digital Selective Calling
EBL	-	Electronic Bearing Line
ETA	-	Estimated Time of Arrival
GMDSS	-	Global Maritime Distress and Safety System
GPS	-	Global Positioning System
Grt	-	Gross registered tonnage
IAMI	-	International Association of Marine Institutes
ICS	-	International Chamber of Shipping
IMO	-	International Maritime Organization
ISO	-	International Standard Organisation
kHz	-	Kilohertz
"Mayday"	-	the international distress signal (spoken)
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
MKD	-	Minimum Keyboard Display
MSC	-	Maritime Safety Committee
NTM	-	Notice to Mariners

OOW	-	Officer of the watch
PEC	-	Pilotage Exemption Certificate
SAR	-	Search and Rescue
SOLAS	-	International Convention for the Safety of Life at Sea
STCW	-	International Convention on Standards of Training, Certification and Watchkeeping incorporating the 1995 Amendments
TCPA	-	Time to closest point of approach
TEU	-	Twenty feet equivalent unit
UTC	-	Universal co-ordinated time
VHF	-	Very High Frequency

Photograph 1

Photograph 2

SYNOPSIS

At 0938 (UTC+8) on 8 April 2005, the German registered container ship *Washington Senator*, which was on passage from Shanghai to Hong Kong at a speed of 17 knots, and the UK registered container ship *Lykes Voyager*, which was on passage from Yantian to Vancouver at a speed of 19.5 knots, collided in the Taiwan Strait. No one was hurt but both ships were damaged and, although there was no pollution, a number of containers were lost overboard. After the collision, both ships sailed to Hong Kong for repairs.

The collision occurred about 4 minutes after *Lykes Voyager* altered course to starboard from 022º to 070º to avoid *Washington Senator*, and *Washington Senator* had altered course to port from about 242º to 190º in accordance with a passing arrangement her master assumed had been made with *Lykes Voyager*. The distance between the ships at the time of the alterations was about 2.5 miles, and visibility was less than 200m in fog. Shortly after each vessel had steadied on their respective headings, both masters realised that the ships had turned towards each other, and were on a collision course. Unfortunately, by that time, the distance had further reduced to the extent that the last-minute avoiding action taken by both ships was unable to prevent a collision.

The investigation identified several contributory factors, including:

- The passing arrangement agreed by the master of *Washington Senator* was made with an unidentified ship, not *Lykes Voyager*.

- The developing close-quarters situation between *Washington Senator* and *Lykes Voyager* could have been resolved solely by the early application of the COLREGS. However, the master of *Washington Senator* opted to contact *Lykes Voyager* on VHF radio.

- By the time *Washington Senator* established VHF communications with *Lykes Voyager*, the distance between the ships was less than 5 miles.

- Identification procedures were not followed during each VHF radio transmission, and the identity of the ship with which the passing agreement was made, which was probably one of many within VHF radio range, was not established.

- The avoiding action taken by *Lykes Voyager* was not taken until the ships had closed to about 2.5 miles. This was due to the inexperience of the third officer, who was focused by the threat posed by a nearby ship being overtaken, and because the master had been distracted.

- The performance of the master of *Lykes Voyager* was possibly affected by fatigue.

- When restricted visibility and large concentrations of fishing vessels were encountered, neither the master of *Washington Senator* nor *Lykes Voyager* considered it necessary to reduce speed below their required passage speeds.

- There is no guidance available to masters of ships which are unable to proceed at a speed which allows them to be stopped within a distance appropriate to the prevailing state of visibility as required by Rule 6 of the COLREGS.

- Neither of the bridge teams made use of the available AIS information to monitor the actions of the other vessel when manoeuvring at close-quarters. This was probably due to several factors, including the absence of specific guidance or instruction from the ship managers, and the method in which AIS information was displayed.

Recommendations have been made to the Maritime and Coastguard Agency (MCA), the Federal Ministry of Transport, Building and Housing, the International Association of Marine Institutes (IAMI), the Association of Marine Educational and Training Institutes Asia-Pacific Regions (AMETIAP), and the International Chamber of Shipping (ICS) for the purpose of:

- Discouraging the use of VHF radio as a tool for collision avoidance.

- Providing additional guidance for determination of safe speed.

- Encouraging ship managers to monitor the application of safe speed.

- Highlighting the potential of AIS information when manoeuvring in a close-quarters situation.

- Advising ship managers of the advantages of displaying AIS information in a format in which it can be readily associated with radar and other sources of navigational information.

- Highlighting the importance of using ships' names and call signs in each transmission when communicating by radio.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *LYKES VOYAGER*, *WASHINGTON SENATOR* AND ACCIDENT

Vessel details	**:**	***Lykes Voyager* (photograph 1)**
Registered owner	:	CPS Number 1 Ltd
Manager	:	Anglo-Eastern Ship Management
Port of registry	:	London
Flag	:	United Kingdom
Type	:	Container
Built	:	1995, Stocznia Gdynia S.A. Poland
Classification society	:	American Bureau of Shipping
Construction	:	Steel
Length overall	:	187.16m
Gross tonnage	:	23540
Engine power and/or type	:	17940kW Sulzer oil engine, direct drive
Service speed	:	19.5 knots
Persons on board	:	24
Injuries	:	None
Damage	:	Extensive damage to shell plating, decks, internal frames, and container stowages in way of the port quarter.

Vessel details:		***Washington Senator* (photograph 2)**
Registered owner	:	Conti Neptun Schiffs-Beteiligungs GmbH&Co.KG MS "*Washington Senator*"
Manager	:	Niederelbe Schiffahrts-Gesellschaft (NSB)
Port of registry	:	Hamburg
Flag	:	Germany
Type	:	Container
Built	:	1994, MTW Schiffswerft GmbH - Wismar, Germany
Classification society	:	Germanischer Lloyd
Construction	:	Steel
Length overall	:	215.653m
Gross tonnage	:	34617
Engine power and/or type	:	20 510kW BV Sulzer
Service speed	:	21.3 knots
Persons on board	:	21
Injuries	:	2 (minor)
Damage	:	Extensive damage to shell plating and internal decks and bulkheads in way of the port quarter.

Accident details

Time and date	:	0938 (UTC+8) on 8 April 2005
Location of incident	:	23º 37'9N, 117º 56'9E, 069º The Brothers Light 15.4nm

1.2 NARRATIVE

(All times are UTC +8 and all courses are true)

1.2.1 *Lykes Voyager*

Lykes Voyager sailed from Yantian, China at 2006 on 7 April 2005, for passage to Vancouver with a cargo of 1800 TEU. Full ahead sea speed was selected at 2118, which gave a speed of about 18.5 knots. This was the speed required to make the ship's intended ETA in Vancouver. After writing his night orders at 2300, the master went to bed. Visibility was good, but fog was forecast for the next few days of the passage. Overnight, the master went to the bridge on two occasions after he had been informed that the visibility had reduced to about 200m, and there were large concentrations of fishing vessels in the vicinity. He remained on the bridge for between 20 and 30 minutes on each occasion. In view of the poor visibility, the ship's whistle was switched on in automatic.

After breakfast, the master returned to the bridge at about 0750. Five minutes later, the third officer relieved the chief officer as the OOW. The master remained on the bridge after the watch handover because the third officer had recently joined, and because the visibility remained at about 200m. He generally stood behind the third officer, who was using the ARPA radar on the starboard side of the bridge **(Figure 1)**. The master was able to monitor both radars from this position. An AB lookout was also present. Course was 039º in autopilot to follow the planned navigational track of 038º **(Figure 2)**, and the speed made good was between 19 knots and 19.5 knots. The sea was calm and the wind was light airs.

Figure 1

Photograph of the command console on the bridge of *Lykes Voyager*

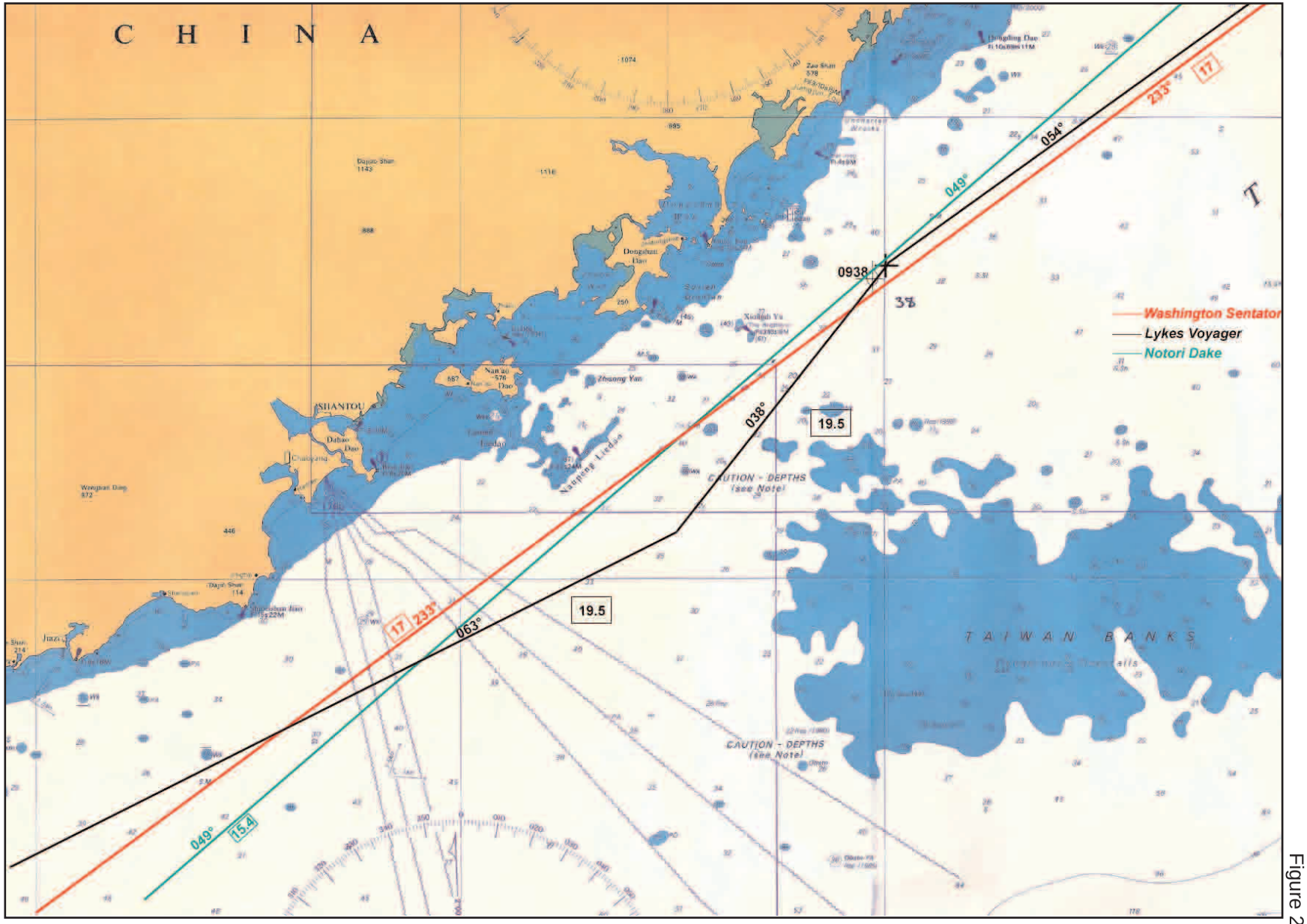


Figure 2

Extract from BA 1968 showing planned tracks

Several minor course adjustments were made to avoid small radar targets, which were considered to be fishing vessels. Between 0915 and 0930, visibility increased to about 1.5nm, and a vessel being overtaken became visible on the starboard bow. The master observed this ship through binoculars. From his recollection of the letters he could see of the vessel's name, along with her general description, the vessel was identified after the accident as the Panamanian registered bulk carrier, *Notori Dake*.

At about the same time, the third officer acquired a radar target fine on the starboard bow at a range of between 8nm and 9nm. She assessed, by its vector, that it was on a course of about 235º. At 0930, the third officer altered course from 030º to 022º to increase the CPA of *Notori Dake*. For this manoeuvre, the AB was put on the helm, and manual steering was selected. Shortly after this alteration, visibility again decreased to about 200m. A call was then heard on the port VHF radio, which was set to channel 16. The call was heard only once, and the accent of the caller was judged to be Filipino or Burmese. The third officer heard a range and bearing in the transmission, but she did not hear the name of the originating ship. She was not sure if the call was intended for *Lykes Voyager*, but decided to respond.

The third officer moved to the port VHF radio, and transmitted something similar to *'this is Lykes Voyager, my position is'*. A latitude and longitude was then relayed directly from the port radar display. As soon as the third officer had finished, another ship transmitted its position, or gave a range and bearing. On hearing this transmission, which was made by a male with an Asian or eastern accent, the third officer presumed that the initial call had not been intended for *Lykes Voyager*, and returned to the starboard radar display. Neither the third officer, nor the master, recollected any further discussion on VHF radio, and assumed that the two ships had changed to another VHF channel.

During the third officer's interchange on VHF radio, the master had moved behind the chart table to read a weather facsimile. Shortly after the third officer returned to the starboard display, he resumed his position behind her. He then saw the radar target previously acquired by the third officer on the starboard bow, which had closed to 4.5 miles. This was the first time he had been aware of this target, and quickly assessed from its vector that it had a close CPA and a speed of about 23 knots. Concerned by the target's proximity and CPA, the master ordered an alteration of course to starboard to 070º to pass between the target on the starboard bow, and *Notori Dake*, which was between 1 and 1.5 miles on the starboard beam.

At the time of the alteration, in addition to the target closing on the starboard bow, and *Notori Dake*, the third officer also saw a radar target to the north west travelling at slow speed on an easterly heading. However, this target appeared to be clear of the situation that had developed. There were also a number of radar targets, which the third officer assumed to be fishing vessels, several miles distant on the port side.

Shortly before the master's intervention, the third officer had displayed the information available for the target on the starboard bow on the ARPA tote. From this, she was aware of its small CPA, and had set the radar display's EBL to 070º as a possible course for avoiding action. The master's intervention was made without discussion with the third officer, and both the master and third officer were aware that on giving the order to alter to 070º, the master had taken the con.

When steady on 070º, the CPA of the approaching target by ARPA was between 4 and 5 cables on the port side. However, about 2 minutes later, when the target was at about 5 cables, its radar vector indicated that it was turning to port towards *Lykes Voyager*. The master immediately ordered starboard 20º, and sounded an additional prolonged blast on the whistle to give warning of his proximity. At about the same time, the 'bows crossing' alert activated on the ARPA. Moments later, the bow of the approaching vessel came into view about one point off the port bow. She looked to be on a reciprocal course with a separation of about 50m, but her stern was swinging towards *Lykes Voyager*. The master ordered the helm hard to port to try and swing the stern of *Lykes Voyager* clear, but the other vessel's stern struck *Lykes Voyager* in the vicinity of No 2 crane. Contact between the two vessels was maintained for several seconds.

1.2.2 *Washington Senator*

Washington Senator sailed from Shanghai, China, at 2006 on 6 April for passage to Hong Kong with a cargo of 1531 TEU. At 0800 on 8 April, the third officer relieved the chief officer as the OOW on the bridge. Course was 233º in autopilot to follow the planned navigational track **(Figure 2)**. Speed was 17 knots, which was the speed required to meet her scheduled ETA. The visibility was 1nm, and had been so for much of the night. The master had not been informed of the reduced visibility. At about 0900, the visibility further decreased to 0.5 mile, and the third officer turned the ship's whistle to automatic. The master, who was on the deck at the time, saw that visibility had reduced, and made his way to the bridge.

The master arrived on the bridge at about 0905. He initially sat at the port ARPA radar display, and the third officer sat at the starboard ARPA radar display **(Figure 3)**. Visibility then reduced to less than 200m. The ship was slowly overtaking a radar target on her port bow, which was on a similar, or only a slightly diverging, course to *Washington Senator*. Its CPA by ARPA was about 9 cables within the next 10 and 12 minutes. Before the master's arrival, the AB lookout had heard a single fog signal on the port side, which had been associated with this target. The third officer saw from the AIS display that this ship was bound for Singapore; he did not note her name.

Figure 3

Photograph of the bridge on *Washington Senator*

A second radar target was ahead or very fine off the starboard bow. This target was moving slowly to the south, and was considered to be a fishing vessel. Its CPA by ARPA was about 2 cables. The third officer intended to pass between the two radar targets, but was told by the master to alter course to starboard and leave both vessels to port. When the third officer received this instruction, he assumed that the master had taken the con. Course was adjusted to between 240° and 243° using the autopilot. The distances of the fishing vessel ahead and the vessel on the port side when this action was taken are not known.

At about the same time as the alteration of course, the third officer informed the master of two distant radar targets on the port bow. The master monitored these targets on the port display, and instructed the third officer to also monitor them on the starboard display. After several minutes, the targets had closed to between 7nm and 8nm, and both ARPA displays indicated that the left hand of the two targets was passing clear to port. The right hand target, however, had a CPA of 2.5 cables ahead, and a speed of about 17 knots.

After being instructed by the master to obtain more information about the right hand target from the AIS display, the third officer associated the target with the AIS data shown for *Lykes Voyager*. No AIS information was obtained regarding the left hand target, which was later identified as *Notori Dake*. The master then instructed the third officer to call *Lykes Voyager* on VHF radio channel 16. The third officer recollects making three separate calls when trying to establish VHF

communication, with about a 1 to 2 minute interval between each call. In each call, the third officer broadcast information taken directly from the ARPA display. This was similar to *"ship in position (latitude and longitude), bearing, distance, course, speed, CPA, this is Washington Senator"*. The name or call sign of *Lykes Voyager* was not used, and each transmission lasted about 40 seconds. The master recollects only one call being made.

A female operator responded to the call, or calls. The third officer and master cannot recollect the exact wording of her reply, but it was similar to: *"this is Lykes Voyager (followed by a latitude and longitude and a range and bearing)"*. At the end of this transmission, the third officer repeated the ARPA information, which ended with the detail of the CPA, namely 2.5 cables. This was acknowledged by the female voice from *Lykes Voyager*. During the transmissions from *Lykes Voyager*, the master recollects hearing a male voice in the background. Shortly after the female operator had finished talking on the final occasion, the VHF transmission seemed to be immediately resumed by the same male voice, which requested *"can we pass starboard to starboard?"*

The master and third officer's accounts differ regarding whether or not a ship's name or call sign preceded this request. The third officer did not recollect a ship's name being used, but the master considered the name *Lykes Voyager* was included in the transmission, although he was not certain. However, he assumed that the request had been made by the master of *Lykes Voyager* because it had followed immediately after the female voice, and the passing arrangement requested was consistent with his own assessment that *Lykes Voyager* was impeded from altering course to starboard by *Notori Dake*. Having assessed that the action requested was safe, and after putting the AB lookout on the helm and ordering him to change to hand steering, the master agreed to the starboard to starboard passing. He also stated that he would alter 40° to port. This intended action was acknowledged by the male voice, which was again assumed to be *Lykes Voyager*'s master.

The master then gave a port helm order to the AB lookout, and informed the third officer that he had taken the con. The master recalls taking this action at about 0930. The third officer moved from the starboard radar display, to check that the change from automatic to manual steering had been completed correctly, and then moved to the chart table, where he plotted the ship's position by GPS at 0935 on the paper chart. The third officer recollects that the ship was turning to port when he did this.

The ship was initially steadied on a course of 200°, which the master estimated to be the reciprocal course to that of *Lykes Voyager*. This action resulted in the CPA of *Lykes Voyager* by ARPA increasing to over 8 cables on the starboard side. However, soon after course was further adjusted to 190°, the master saw from the radar return of *Lykes Voyager*'s wake, that she was altering course to starboard. Her bearing also became steady by radar. The master felt that he

was unable to alter any further to port because of *Notori Dake*, which was about 4 points off his port bow. Therefore, he ordered the helm to be put hard to starboard. Shortly after, *Lykes Voyager* became visible off the port bow. Although the helm was immediately put hard to port to try and swing the stern clear, this action was unsuccessful.

1.2.3 *Notori Dake*

Notori Dake, a 17999grt Panamanian bulk carrier, managed by Wallem Ship Management Ltd, was on passage from Hong Kong to Nakhodka, Russia. The Ukrainian third officer was the OOW, and he was accompanied on the bridge by the Russian master, a helmsman and a lookout. The ship was in hand steering and was at full ahead sea speed, making good between 15 and 16 knots over the ground. The planned track was 049° **(Figure 2)**, but because of a large number of small radar targets, assumed to be fishing vessels, the ship frequently had to alter course, and generally had to keep to the east of the intended track.

The ship's two radar displays were switched on and were operating correctly. The port display, which was interfaced to a separate ARPA unit, was in true motion, fixed origin on the 3-mile range scale, and was centred. The starboard display was also in true motion, fixed origin, but was on the 6-mile range scale, and was offset to the south-west to scan about 9 miles ahead of the ship. The bridge was fitted with two VHF radios, both of which were set to channel 16, and an AIS display.

The master and third officer stated that they did not see, plot or acquire the radar targets of *Lykes Voyager* or *Washington Senator*, or observe any details relating to these ships on the AIS display. They were not aware that *Lykes Voyager* had been overtaking *Notori Dake*, and did not know that *Lykes Voyager* and *Washington Senator* had collided until 13 April. The master was aware of numerous fishing vessels in the vicinity at the time of the collision, many of which he considered to be pair trawlers, which, in his experience, frequently merge into a single target. The master felt that the presence of these trawlers might have prevented *Notori Dake* from detecting and identifying either *Lykes Voyager* or *Washington Senator*. The master and the third officer stated that they did not make, or respond to, any VHF calls during the morning of 8 April, and did not hear any "Mayday" or other emergency calls on VHF channel 16.

1.3 ACTION FOLLOWING THE COLLISION

Immediately following the collision, both masters reduced speed. The engine of *Lykes Voyager* was placed to stop, while the engine of *Washington Senator* was placed to dead slow ahead. The general alarm was sounded in both ships, and both crews were mustered.

The master of *Lykes Voyager* instructed the third officer to transmit a "Mayday" on VHF radio channel 16. He was aware the ship had suffered extensive damage, and did not know if the hull had been breached below the waterline. The "Mayday" call was made on several occasions, and, at about 1000,

Washington Senator responded. She was the only vessel to do so. In the subsequent VHF radio conversations between the two masters, the master and third officer of *Washington Senator* considered that the voice of *Lykes Voyager*'s master was identical to that of the person with whom he had made the passing agreement before the collision. However, they could not be completely sure of this.

Both ships were badly damaged in the collision, and a number of containers lost overboard. A number of the remaining container stacks were also de-stabilised, particularly on board *Lykes Voyager*. The collision also caused disruptions to the power supplies in *Lykes Voyager*, and the ingress of heavy fuel from a settling tank into the engine room on board *Washington Senator*. Details of the engineering response and damage for each ship are at **Annexes A and B**.

As soon as it was apparent that *Lykes Voyager* was not in imminent danger, the "Mayday" transmissions on VHF channel 16 were stopped, and replaced with advisory messages informing other ships in the vicinity that the ship was not under command. During the period the "Mayday" and advisory messages were being transmitted by the female third officer, several cat calls, wolf whistles and lewd comments were heard on the same channel.

Washington Senator was released from the scene at 1036 and resumed her passage to Hong Kong, where she arrived early the following morning. Supported by technical advice from the ship manager, work continued on board *Lykes Voyager* throughout the day, to stabilise the containers on deck and to restore normal power supplies. The ship was able to resume passage at 2116, turning back to Hong Kong, where she anchored at 2130 the following evening.

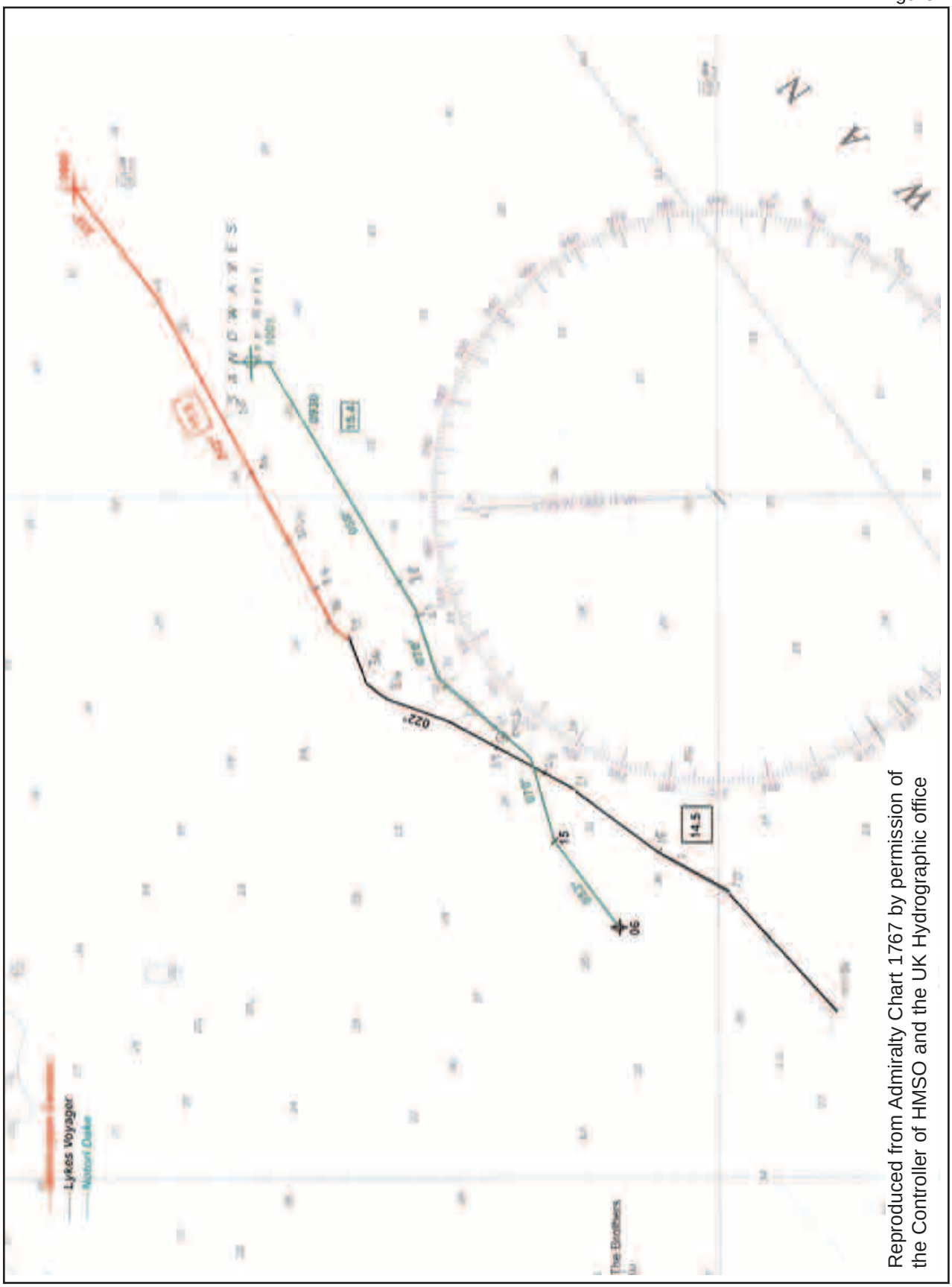
1.4 RECORDED INFORMATION AND TRACK RECONSTRUCTION

An extract of the course recording of *Lykes Voyager*, from 0800 to 1000 on 8 April, is at **Annex C**. According to the ship's engine data logger, the time at which the master of *Lykes Voyager* stopped the engine following the collision was recorded as 0937 and 57 seconds.

Washington Senator did not carry a course recorder, and its engine data logger was not working.

The reconstructed ground tracks of *Lykes Voyager*, *Washington Senator*, and *Notori Dake* are shown at **Figure 4**. This reconstruction is based on the recorded information available, GPS positions recorded on the paper charts, navigational records and accounts from witnesses. The time of the collision has been based on the time recorded by *Lykes Voyager*'s engine data logger, which is within 1 minute of the time noted on board *Washington Senator*.

Figure 4



Extract from BA 1767 showing the reconstruction of the ground tracks

1.5 BRIDGE TEAMS

1.5.1 *Lykes Voyager*

The master

The master had been at sea since 1978. He first served at sea as a master in 1996, and first served as a master of a container ship in 2000. The master joined Anglo-Eastern in July 2003, and *Lykes Voyager* on 8 February 2005 in Vancouver, on a 6 month contract. During the 72 hours before the collision, the master had about 10.5 hours sleep, taken in 6 separate periods. This had been due to cargo delays in Hong Kong on 6 April 2005, disruptions to his sleep on the night of 7 April 2005 as a result of the reduced visibility and the incidence of fishing vessels, the need to accompany the recently joined third officer on the bridge, and his inability to sleep on several occasions when the opportunities arose. He did not routinely keep watches, and stated that he did not feel tired at the time of the accident. He also stated that he was accustomed to the pressure of the routine of a container ship.

The master had attended a bridge team management course in February 2004, which covered all aspects of shiphandling, passage planning, collision avoidance regulations, bridge team work and management, and control of navigational errors. He also attended a maritime resource management course in January 2005, which covered the principles regarding bridge resource management as outlined in the STCW Code. Both courses were conducted at the Anglo Eastern Maritime Training Centre in Mumbai, India.

The master did not feel under any particular pressure from his charterers to maintain schedules, although he had been rebuked in the past by other charterers for failing to meet schedules. The owners and operators, CP Ships, provided the schedules for the loading and discharge ports in the Far East, but it was the master's responsibility to calculate the arrival times for trans-ocean passages. On this occasion, he had calculated the ETA for Vancouver after sailing from Yantian. The master stated that he did not usually reduce speed when encountering restricted visibility.

The third officer

The third officer successfully completed her training at the Warsash Maritime Centre in the United Kingdom in June 2004. The course comprised shore and sea-based training. The third officer then served on board *TMM Tabasco* for 5 months. After 2 months' leave, she joined *Lykes Voyager* at 0930 on 6 April 2005 in Hong Kong. She had accompanied the master on the bridge for the brief passage from Hong Kong to Yantian on 7 April 2005 in order to familiarise herself with the bridge equipment. On sailing from Yantian, the third officer was the OOW, but had been accompanied by the master until 2300. The collision occurred during her second watch as OOW.

The third officer had slept well on 5 April 2005 after her flight from the UK to Hong Kong. During the 48 hours before the collision, she managed to sleep for about 19 hours in 4 separate periods, and felt well rested when taking over the watch on the morning of 8 April 2005.

1.5.2 *Washington Senator*

The master

The master first went to sea in 1965 as a cadet. During his career, he had spent 13 years on heavy lift vessels operating worldwide, and 1.5 years as chief officer on board a floating crane. He first served as a master in 1991, and before joining Niederelbe Schiffahrts-Gesellschaft (NSB) in 2001, his commands included a seismic research vessel, and a coaster operating in the Irish Sea, for which he had obtained PECs for Liverpool, Belfast and Dublin. Since joining NSB, he had been master of several container ships ranging from 1600 to 3000 TEU, mainly operating in the Far East. The master had successfully completed a combined Bridge Resource Management-Bridge Team Management and Shiphandling course, in April 2002. He joined *Washington Senator* on a 4 month contract on 3 March 2005.

The master did not normally keep watches. During the 48 hours before the collision, he had managed to sleep for about 13 hours in 2 separate periods. He felt refreshed when he woke at 0730 on 8 April 2005.

The master considered that 17 knots was a reasonable speed for the conditions, and did not feel under any pressure to arrive in Hong Kong in accordance with the ship's schedule. He stated that he would have no hesitation in reducing speed if he thought it necessary, and was content for his officers to take this action, providing they kept him informed.

The master had learned to operate the AIS display by reading its operations manual on his previous ship, which was fitted with the same model. He routinely programmed the AIS before sailing, with information such as draught, ETA and cargo, and found the equipment useful for providing long-range warning of approaching vessels. However, the master used AIS with caution because he was conscious that not all vessels carried the equipment.

1.5.3 The third officer

The third officer first went to sea in 1989 as a deck rating. After joining NSB in 1998, he qualified as a third officer in 2000, and was promoted on July 29 2002. He then completed a training course in collision avoidance in January 2003. Since joining NSB, the third officer had served only on board container ships. He joined *Washington Senator* on 8 February 2005 in Hong Kong. This was the first time he had served on board this ship, and routinely kept the 0800 to 1200 and 2000 to midnight watches on the bridge.

The third officer assumed the master had taken the con when he was instructed to alter course to starboard to avoid the fishing vessel at 0910. In his experience, the master took the con when he intervened in this way, even though this was not formally stated or recorded. After adjusting course to starboard as instructed, the third officer waited for orders from the master; he did not formulate his own plan of action with regard to *Lykes Voyager*.

The third officer stated that he felt comfortable with the ship proceeding at 17 knots, but if he considered a reduction in speed to be necessary, he would call the master before doing so. When interviewed during the investigation, the third officer was uncertain of the manoeuvring characteristics of the ship with regard to turning circles and stopping distances. He was aware of the requirement to call the master on encountering restricted visibility, but did not determine whether or not the master had been called for this reason when he relieved the chief officer on 8 April 2005.

1.6 RADAR AND AIS DISPLAYS, AND VHF RADIO

1.6.1 *Lykes Voyager*

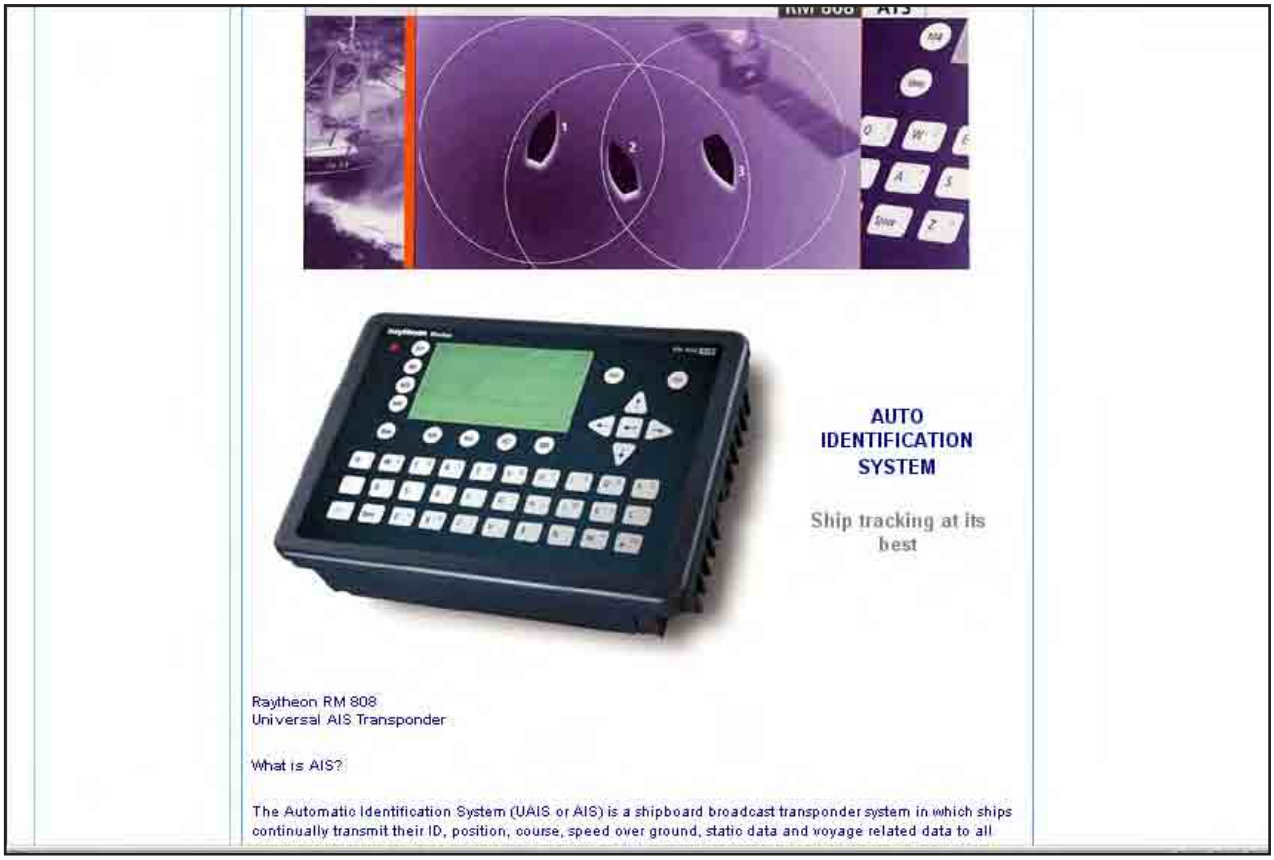
Lykes Voyager was fitted with two radar displays, one on the port and the other on the starboard side of the command console **(Figure 1)**. Both radars were switched on. The starboard display was operating in true motion, fixed origin, and the port display was operating in relative motion. The starboard display was an ARPA display, and was offset to the south west. This display was predominantly set to the 6 mile range scale, which gave a range ahead of about 9nm. The range scale was occasionally adjusted to the 3nm or 12nm scales. The third officer was not familiar with the operation of this model of ARPA display fitted, but felt she had sufficient knowledge to be comfortable when on watch.

The CPA/TCPA alarm on the ARPA display was set to 1nm and 10 minutes, and functioned correctly (both audio and visual alarms) when tested by MAIB inspectors after the collision. The third officer did not recall seeing or hearing this alarm before the collision.

The ship was fitted with a Raytheon RM 108 AIS display **(Figure 5)**, sited adjacent to the ARPA display. This was a minimum keyboard display, which showed AIS information as text only. The third officer did not obtain any information from the display regarding the other vessels in the vicinity during the period before the collision, and the transmitted status of the vessel was not amended to 'not under command' after the collision.

Two VHF radios were available on the bridge, sited either side of the command console **(Figure 1)**. The port radio was set to channel 16, and the starboard radio was set to channel 88 for communication with the chief officer when working on deck.

Figure 5



Photograph of type of AIS used on board *Lykes Voyager*

1.6.2 *Washington Senator*

Two ARPA radar displays were fitted on the bridge of *Washington Senator*. After the master arrived on the bridge at about 0905, he adjusted both displays to optimise the quality of the radar picture, which was good. Before the collision, the third officer mainly used the starboard display, and the master the port display. Both displays were switched between true and relative motion, and between the 3nm, 6nm, and 12nm range scales. They were also off-centred to the north east, giving a detection sector from six points on each bow out to a range ahead of about 16nm with the12nm range scale selected, and about 8nm with the 6nm range scale selected. The CPA/TCPA alarms on both displays were set to 1nm and 10 minutes respectively.

The ship was fitted with a Sam Electronics DEBEG 3401 AIS, which has a graphical display **(Figures 3 and 6)**. A VHF radio was sited on either side of the command console, both of which were set to channel 16.

Figure 6

Photograph of the AIS on board *Washington Senator*

1.7 THE SHIP MANAGERS

1.7.1 *Lykes Voyager*

Lykes Voyager was owned and commercially operated by CP Ships, and was managed by Anglo-Eastern Ship Management. The ship manager was established in 1974, and has about 165 ships under its full technical management, operating with 21 different administrations. It provides crews for a further 70 ships, and employs around 8000 seafarers and 500 shore personnel, mainly in its offices in Hong Kong, Singapore, Glasgow, Antwerp, and Montreal and in its maritime training centre in Mumbai, India, which provides over 60 maritime courses. The ships managed by the company are divided into fleets of about 30, each headed by a fleet director. *Lykes Voyager* was one of a fleet of 34 container ships managed by the company's office in Hong Kong.

The company has a dedicated quality assurance section, which is responsible for the quality of training, safety management procedures, and accident investigation. The quality assurance director is based in Hong Kong, and reports directly to the company chief executive officer. He organises annual internal audits for all the company's managed ships through a network of auditors based in Hong Kong, Singapore, Houston, Manila, Antwerp, and Mumbai. The director analyses the results of all external and internal audits, which are also read by the company chief executive and group managing director, who is also the company's DP for all its vessels. These audits, along with port and flag state

inspections, are used by the quality assurance director to produce an annual management review. The director also oversees the company's accident analysis system, into which all reported accidents and near misses on board the company's ships are recorded, in order to learn from the experience and prevent similar accidents occurring.

CP Ships conducts annual surveys on all its ships, separate from the ship managers, covering all aspects of safety, technical and navigational issues in accordance with the ISM Code and the company's ISO 14001 policy.

1.7.2 *Washington Senator*

Washington Senator was managed by NSB, and was on charter to Hanjin. The ship manager was founded in 1982, and since 1986 has been located in Buxtehude near Hamburg, Germany. NSB has a fleet of 79 ships operating worldwide, and employs about 1900 seafarers and 120 shore personnel.

The company has a quality, safety and environmental management system in place. Within its safety management regime, the company employs one DP, located in Buxtehude, with a nominated substitute for all its ships. The DP organises the annual audits for all ships managed by the company, and is supported in his role by a team of 25 qualified internal auditors based in several locations worldwide, along with administrative staff in Germany. The company projects that it will increase in size in the future, and plans to develop its own training facility for use by its personnel.

The company has a procedure in place for the reporting of accidents, and issues a 'Fleet News' circular every 4 months, which includes a brief analysis of the major accident reports received.

1.8 ORDERS, PROCEDURES, AND INSTRUCTIONS

1.8.1 *Lykes Voyager*

In its shipboard manual, the instructions issued by Anglo Eastern regarding the minimum precautions to be taken when navigating in restricted visibility include:

The vessel must proceed at safe speed as prescribed in the 'Regulations for Preventing Collisions at Sea'. ***Commercial considerations are secondary to the safety of the vessel.***

The use of VHF to agree upon any action to avoid collision is strongly discouraged, especially in restricted visibility.

Included in the master's standing orders were:

As far as possible take early and substantial action to avoid close quarters situation. Whether vessel is in a Stand-on of Give-Way situation, it is recommended that evasive action be taken when the distance between two vessel's are in excess of 4 miles. When in open waters take action so that the CPA is greater than two miles. In congested waters, the CPA must as far as possible be at least half mile. [sic]

Anglo-Eastern had not issued a policy or procedure for the use of AIS in collision avoidance, although the company had provided guidance to its ships on the capabilities of AIS, including IMO Resolution A917(22).

1.8.2 *Washington Senator*

Included in the company procedures, with regard to taking over a navigational watch, is:

A navigational watch is relieved if

- *The relieving Officer/Master explicitly takes over the watch*

They also state:

Calling the Master to the bridge will not transfer the conn from the watch officer to the master. Until such a time as the master actually declares that he has the conn the OOW must still carry out his duties as he was prior to the master's arrival. Once the master has taken the conn and the event is logged, then the watch officer moves into a supportive role, but is still responsible for the action of his watch members.[sic]

The ship manager had not issued any policy or procedures with regard to the use of VHF or AIS in collision avoidance, but the company's 'Bridge Operational Manual' required the master to issue written instructions to cover such matters as:

- *reducing speed in the event of restricted visibility or other circumstances (distances should be specified)*
- *the use of echosounders, radar and other navigational aids*
- *the need for additional information in order to reduce the risk of false decisions*
- *radio-communications*

With regard to navigation in restricted visibility, the master's standing orders stated:

- *Call the Master if the visibility is less than 3nm*
- *Radar 1 + 2 are to be taken in service*
- *Fog signal has to be sounded*
- *Post an additional lookout*

1.9 INTERNATIONAL REGULATIONS FOR THE PREVENTION OF COLLISIONS AT SEA [COLREGS]

Extracts of these regulations regarding action to avoid a collision, lookout, safe speed, and conduct in restricted visibility are at Annex D.

1.10 THE USE OF VHF FOR COLLISION AVOIDANCE

1.10.1 *Lykes Voyager*

The master rarely used VHF radio, and never used it to resolve close-quarters situations. In circumstances where the use of VHF radio was unavoidable, such as when communicating with port authorities or pilots, he usually delegated this task to the OOW, rather than operate the VHF himself.

1.10.2 *Washington Senator*

The master of *Washington Senator* seldom used VHF for collision avoidance, but did so on this occasion because he did not want to alter course further to starboard due to the proximity of The Brothers **(Figures 2 and 4)**, which would probably have had a high level of fishing activity in their vicinity. He also assessed by radar that *Lykes Voyager* was unable to alter course to starboard due to the ship she was overtaking. He recalled reading in the AIS operations manual that one of the benefits of AIS was to provide clarification when using VHF in collision avoidance.

The third officer of *Washington Senator* had previously seen the master use VHF radio to clarify an overtaking situation in the Malacca Strait, but recalled the use of VHF for collision avoidance being discouraged during his training in the Philippines.

1.10.3 Guidance

In January 2001, the MCA issued MGN 167 (M+F) titled 'Dangers in the Use of VHF Radio in Collision Avoidance', **(Annex E)**. The summary of the MGN states:

Although the use of VHF radio may be justified on occasion in collision avoidance, the provisions of the Collision Regulations should remain uppermost, as misunderstandings can arise even where the language of communication is not a problem.

Guidance was also issued in the German NTM 01/05 (NFS 01/05) **(Annex F)** which stated:

Past experience has shown that the use of VHF radio by ships to agree manoeuvres in collision avoidance may in fact be the cause of serious risk situations, in particular due to:

- *the difficulty of clearly identifying other vessels at sea,*
- *misunderstandings caused by imprecise communication or insufficient language skills,*
- *collision avoidance manoeuvres not complying with the steering and sailing rules of the Regulations for Preventing Collisions at Sea.*

- *Besides, in close-quarters situations, valuable time may be lost in establishing contact on VHF radio, which should be better used to take early and effective action according to the Regulations for Preventing Collisions at Sea.*
- *When taking action to avoid a collision, the vessel's master should be aware of the fact that collision avoidance action using VHF involves risks and potentially serious consequences.*

The MCA also issued guidance on the use of VHF at sea in MGN 22(M+F) **(Annex G)**. With regard to discipline, the actions to be avoided included:

Calling on channel 16 for purposes other than distress, urgency and very brief safety communications when another calling channel is available;

Non-essential transmissions, e.g. needless and superfluous signals and correspondence;

Transmitting without correct identification; and

Use of offensive language.

1.11 THE USE OF AUTOMATIC IDENTIFICATION SYSTEMS

1.11.1 Guidance

AIS systems were fitted to both *Lykes Voyager* and *Washington Senator*, in accordance with the requirements of SOLAS chapter V, which required ships other than passenger ships and tankers, between 300 and 50,000 grt to have AIS fitted and operational by 31 December 2004 at the latest. The IMO produced guidelines for the installation of shipborne AIS in its IMO SN/Circ.227, and also provided guidelines for its operational use in its Resolution A.917 (22). The guidelines on its operational use included:

43. Once a ship has been detected, AIS can assist in tracking it as a target. By monitoring the information broadcast by that target, its actions can also be monitored. Changes in heading and course are, for example, immediately apparent, and many of the problems common to tracking targets by radar, namely clutter, target swap as ships pass close by and target loss following a fast manoeuvre, do not affect AIS. AIS can also assist in the identification of targets, by name or call sign, and by ship type and navigational status.

Additional operational guidance for the use of AIS on board ships was issued by the MCA in its MGN 277(M+F). Among the guidance included in this notice is:

Many shipowners have opted for the least cost AIS installation to meet the mandatory carriage requirement. By doing so, many of the benefits offered by graphic display (especially AIS on radar) are not realised with the 3-line 'Minimum Keyboard Display' (MKD).

Figure 7

Type of ship	Reporting Interval
Ship at anchor	3 minutes
Ship 0-14 knots	12 seconds
Ship 0-14 knots and changing course	4 seconds
Ship 14-23 knots	6 seconds
Ship 14-23 knots and changing course	2 seconds
Ship>23 knots	3 seconds
Ship>23 knots and changing course	2 seconds

Time Intervals for the Display of Dynamic AIS Information

1.11.2 Information provided

The information provided by AIS is divided into: static information related to a ship's descriptions, and includes its call sign and name; dynamic information, including position, and course and speed over the ground; voyage related information, including destination, draught, and hazardous cargoes; and short safety related messages. Static and voyage related information is transmitted every 6 minutes, or on request. The reporting interval for dynamic information is dependent on a ship's speed and whether or not it is changing course. This is shown at **Figure 7**.

1.12 GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)

The GMDSS was adopted by IMO in 1988, with transitional arrangements to be completed following a period of transition between February 1992 and February 1999. The distress and safety system used by most of the world's shipping until February 1992, required a morse radiotelegraphy watch on 500kHz for passenger ships, irrespective of size, and cargo ships of 1600 grt and above. It also required a radiotelephone watch on 2182kHz and VHF channel 16 on all passenger ships and all cargo ships of 300 grt and above on international voyages. This system relied primarily on the capability of a vessel in distress to alert another vessel for assistance. The weakness of this system was that calls for assistance might be unheard in remote areas, or even ignored.

The GMDSS is automated, and uses ship to shore alerting by means of both satellite and terrestrial radio. SAR authorities ashore, as well as shipping in the vicinity, receive the Digital Selective Calling (DSC) alert, when activated by a casualty. Shore based rescue authorities now have the primary role of co-ordinating assistance and rescue operations following the receipt of a distress alert.

Although the introduction of the GMDSS eliminated compulsory aural watchkeeping on 2182kHz, the requirement for an aural watch to be maintained on VHF channel 16 remains, to provide a distress alerting and communication channel for non-SOLAS vessels, and bridge to bridge communications for SOLAS ships.

Lykes Voyager and *Washington Senator* complied with the GMDSS carriage requirements for vessels of their size and area of operation. Both were capable of initiating a DSC alert via terrestrial and satellite radio.

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

The work patterns and rest periods of *Washington Senator*'s master and third officer indicate that they should have been reasonably well rested at the time of the collision. The third officer of *Lykes Voyager* had only recently joined, and she also appears to have had sufficient rest opportunities since travelling from the UK to Hong Kong only 3 days before the accident.

The master of *Lykes Voyager* had been on board for 2 months. He had not kept bridge watches during that time and, other than the passage between Hong Kong and Yantian, the ship's schedule provided sufficient time at sea to facilitate relatively undisrupted periods of sleep. However, although the master stated that he did not feel tired on the morning of 8 April 2005, he had achieved only 10.5 hours sleep in 6 separate periods in the previous 72 hours. This was due to cargo delays, restricted visibility, concentrations of fishing vessels, a need to accompany the inexperienced third officer on the bridge, and his inability to sleep during the opportunities available. Therefore, it is possible that his performance was affected by fatigue to some degree.

2.3 SEQUENCE OF EVENTS

Figure 4 shows that until about 0934, *Lykes Voyager* and *Washington Senator* were travelling towards each other, and that *Lykes Voyager* was overtaking *Notori Dake*. The bridge teams on *Lykes Voyager* and *Washington Senator* had detected the other ships at ranges in excess of 8 miles, and had acquired the respective targets on ARPA.

Washington Senator was the first to determine the close CPA of the two ships, and her master realised that the initial predicted passing distance of 2.5 cables required avoiding action to be taken. This was at about 0927, when the ships were 7 miles apart. The action he decided upon was not to initiate a manoeuvre, but to call *Lykes Voyager* on VHF radio.

The third officer on board *Lykes Voyager* heard a VHF radio call on channel 16. This occurred after the ship had altered to 022° at 0930 to increase the CPA of *Notori Dake*. At this time, the distance between the ships was less than 5 miles, and the effect of the alteration on the CPA of *Washington Senator* had not been considered. The third officer was not aware which ship had made the call, or if it was intended for *Lykes Voyager*, but decided to respond. After making her response, neither she, nor the master of *Lykes Voyager* participated in any

further VHF conversations before the collision. Therefore, during the VHF conversation which immediately followed, it is evident that *Washington Senator*'s master agreed to a starboard to starboard passing arrangement with a person on board another, unidentified ship, but not *Lykes Voyager*.

The master of *Lykes Voyager* only became aware of the radar target of *Washington Senator*, when at about 4.5 miles. He assessed that the target had a close CPA, and he altered course to starboard to 070° to avoid it. This action was taken at about 0934, when the ships were about 2.5 miles apart. At about the same time, or very shortly after, *Washington Senator*'s master altered course to port to 200° in accordance with the agreement he had made with - whom he assumed to be - *Lykes Voyager*'s master.

The master of *Washington Senator* recollects altering to 200° at about 0930. However, this is not consistent with the third officer's recollection that the ship was turning to port when he plotted the GPS position on the chart at 0935. Also, had *Washington Senator* altered at 0930, she would have also been steady on 200° for about 2 miles before the collision. This does not correlate with the reconstruction of her ground track from 0901, and was unlikely to have resulted in *Notori Dake* being off her port bow on completion of the alteration to 200º as recalled by the master. The fact that the alteration was not evident from her ARPA vector on board *Lykes Voyager*, until just before the collision, also indicates that this alteration was taken a few minutes later than 0930.

Shortly after each vessel had steadied on their respective headings, both masters realised that the ships had turned towards each other, and were on a collision course. Unfortunately, by that time, the distance had further reduced to the extent that the last-minute avoiding action taken by both ships was unable to prevent collision.

2.4 THE USE OF VHF RADIO IN COLLISION AVOIDANCE

The use of VHF radio in collision avoidance is an area of contention between seafarers. Its use is favoured in some areas of the world, such as North America, but discouraged in others, including the UK and Germany. The instructions issued by Anglo Eastern, in this respect, were unambiguous and clearly directed its officers not to use VHF radio for this purpose. *Lykes Voyager'*s master adhered to this policy. Of the deck officers on board *Washington Senator*, only the master used VHF to assist in collision avoidance, and then only occasionally.

The traffic situation on this occasion, although complicated by reduced visibility, was not unusual, and could have been resolved solely by the correct application of the COLREGS. When *Washington Senator*'s master determined that the CPA of *Lykes Voyager* was 2.5 cables, compliance with Rules 8 and 19 of the regulations would have enabled him to alter course to starboard, to reduce speed, or both, in order to avoid the developing close-quarters situation ahead.

Had he altered course to starboard at that point, the manoeuvre would only have needed to be maintained until *Lykes Voyager* was clear. With a closing speed of 36 knots, and with the ships about 7 miles apart, this would have taken only 12 minutes. An alteration of course to starboard, could, therefore, have been made without encroaching on The Brothers, which were over 15 miles away, or encountering the fishing vessels reported to be at a distance of several miles to the north-west of *Lykes Voyager*, both of which the master stated that he was concerned about.

Even if an alteration of course to starboard was not possible, and therefore a close-quarters situation could not be avoided, Rule 19(e) required *Washington Senator* to reduce speed. This would have allowed more time for all of the vessels to accurately assess the situation and to determine appropriate avoiding action. However, the master of *Washington Senator* does not appear to have considered reducing speed, despite stating that he would do so if he considered it necessary. Instead, he opted to maintain his course and speed, and to contact *Lykes Voyager* via VHF radio. By the time contact was established, the ships had closed to within 5 miles.

After the third officer on board *Lykes Voyager* had completed her response on VHF radio, the identity of the operator who immediately followed her was not questioned, even though his transmission, unlike that of *Lykes Voyager*'s third officer, was not prefixed with a ship's name or call sign The master assumed he was speaking to the master of *Lykes Voyager* because he heard a male voice in the background when the female third officer was transmitting, and the same male voice appeared to quickly take over when the third officer had finished. His assumption was re-enforced by the proposed agreement, which accorded with his assessment of the situation between *Lykes Voyager* and *Notori Dake*. Unfortunately, it is evident that the master was wrong in his assumption, and the passing agreement was not made with the master of *Lykes Voyager.* Had proper identification procedures been followed, the identity of the ship with which the passing agreement was made, which was probably one of many within VHF radio range, would have been established.

The passing agreement made by *Washington Senator* required her to make an alteration of course to port. This was contrary to the requirements of Rule 19 of the COLREGS. It was not an action expected by the master of *Lykes Voyager*, who was unaware of the identity of the target on his starboard bow, and the passing agreement made by *Washington Senator.* The alteration of course to starboard by *Lykes Voyager* was in accordance with the requirements of Rules 8 and 19 of the COLREGS. Had *Washington Senator* agreed to a passing arrangement which also required her to manoeuvre to starboard in compliance with the COLREGS, the ships would have passed clear, despite the misidentification of ships on VHF radio.

The guidance provided in MGN 167 (M+F) **(Annex E)**, acknowledges that the use of VHF radio might, occasionally, be justified in collision avoidance, and along with NFS 01/05 **(Annex F)**, it highlights its potential dangers. These include: the loss of valuable time when relaying messages instead of complying with the COLREGS; the uncertainties in the identification of vessels; and the perils of manoeuvring contrary to the requirements of the COLREGS. This collision provides excellent illustrations of all these dangers.

2.5 BRIDGE TEAM MANAGEMENT - *LYKES VOYAGER*

*Lykes Voyager'*s third officer detected and acquired *Washington Senator* at a range of between 8 and 9 miles, but no action was taken to avoid a collision until they had closed to about 2.5 miles. The third officer had been aware of this target for at least 9 minutes, but was still only preparing to take action when the master intervened. This was probably due to her inexperience. She had only been qualified since June 2004, and this was her second watch of her second contract.

It was not unexpected for her to be focused on keeping clear of *Notori Dake*, the nearest radar target. This was illustrated by the alteration of course to 022° at 0930. The action was successful in increasing the CPA of *Notori Dake*, but it was taken without consideration of its effect on the CPA of the radar target closing on her starboard bow, or the consequences of altering course to port in restricted visibility. The third officer's pre-occupation with *Notori Dake* was also demonstrated by her failure to view the ARPA information for *Washington Senator,* regarding her course, speed and CPA as soon as it became available after acquiring her target at about 8 miles. This perhaps also demonstrated the third officer's lack of appreciation of the 36 knot closing speed of the two vessels, which gave less than 13 minutes in which to take avoiding action. The third officer was also distracted by the VHF radio call from *Washington Senator*.

Lykes Voyager's master was aware of the third officer's inexperience. He had remained on the bridge with her for most of her first watch on board after sailing from Yantian and, because of the restricted visibility and fishing vessel activity, he had accompanied her on the bridge throughout her watch on the morning of the collision. In the conditions which prevailed, it would have been reasonable for the master to work alongside the third officer. This does not appear to have been the case, and he was not aware of the radar target of *Washington Senator* until it had been showing on radar for about 8 minutes. This was possibly because he was distracted by the sighting of *Notori Dake* during the brief period of increased visibility, when he took time to look at the ship through binoculars, and also when reading the weather facsimile at the chart table. It is possible, for the reasons outlined in paragraph 2.2, that these distractions resulted in the master's concentration being adversely affected due to fatigue. However, when he saw the target of *Washington Senator*, he assessed within about 3 minutes that there was a risk of collision, and his alteration to starboard was bold and in accordance with Rule 19 of the COLREGS.

2.6 BRIDGE TEAM MANAGEMENT - *WASHINGTON SENATOR*

During the investigation, several flaws in the bridge management of *Washington Senator* were evident:

- First, the third officer assumed that the master took the con from him at about 0910, when he was told to alter course to starboard to avoid the fishing vessel, whereas the master considered that he took the con at about 0935 when altering course to 200°. Therefore, the master and the third officer were under the impression that the other had the con for a period of 25 minutes.
- Second, although visibility had reduced to 1 mile for much of the night, none of the watch officers had informed the master.
- Third, the third officer was unfamiliar with the manoeuvring characteristics of the ship.
- Finally, the third officer did not consider he had the master's authority to reduce speed if he felt it necessary to do so.

On this occasion, none of these flaws had a direct bearing on the accident. Nevertheless, they highlight a lack of compliance or understanding with both the ship manager's, and the master's requirements with respect to how the bridge team should operate.

2.7 SAFE SPEED IN RESTRICTED VISIBILITY

At the time of the collision, the visibility was less than 200m; *Lykes Voyager* was proceeding at 19.5 knots, and *Washington Senator* at 17 knots. Neither of the vessels could have stopped within 200m, which was approximately the distance from their bridges to their bows. As such, it could be argued that they did not comply with Rule 6 of the COLREGS **(Annex D)**, which states:

Every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions.[sic]

However, large ships, such as *Washington Senator* and *Lykes Voyager,* take a lot of sea room to stop, even when proceeding at very slow speed. Therefore, the use of stopping distance alone, in this respect, is generally of no practical value to ships of this type. Notwithstanding this, the Rule also lists criteria to be used to judge what is a safe speed, which includes the state of visibility and traffic density. Both masters were experienced, and had recently completed bridge team and resource management courses. They both also stated that they did not feel under pressure to adhere to the ship's schedules. Despite this, neither of them considered it necessary to reduce speed when both restricted visibility and large concentrations of fishing vessels were encountered. In the case of *Lykes Voyager*, it was even emphasised in her shipboard manual that safe speed was more important than commercial considerations.

In the experience of the MAIB, it is likely that many masters would have acted similarly to the masters of *Lykes* Voyager and *Washington Senator*, in the same situation. Indeed, the master of *Notori Dake* also remained at full speed. Increased trust in the accuracy and reliability of radar, and other navigational equipment, along with the advent of larger, less manoeuvrable ships, have undoubtedly contributed to this behaviour.

The determination of safe speed is problematic. There are many types of ships, each with their own manoeuvring characteristics, and it is impossible to be prescriptive with regard to safe speed. Therefore, it is considered that further guidance to help masters in their determination of safe speed is required. Such guidance should include an emphasis on the importance of calculating the distance required for ships to respond to the unexpected actions of others. In this case, it was evident that the course alterations of both ships, taken when they were about 2.5 miles apart, were not detected in sufficient time by the other ship to allow effective avoiding action to be taken. These ships closed at a speed of 36 knots. Had this been 18 knots, it would have doubled the time available for the masters to detect and react to the unexpected action of the other. Doubling the distance at which the action was taken, would have had the same result. Careful consideration of a minimum acceptable CPA is, therefore, essential when determining safe speed. Additional guidance could also include advice to vessels which are unable to proceed at a speed which allows them to be stopped within the prevailing visibility, the importance of simultaneous long and short range radar scanning, and the need for factors affecting the performance of bridge teams, such as inexperience, familiarity with equipment, and fatigue, to be taken into account.

Following the collision between *Diamant* and *Northern Merchant*, in restricted visibility in the Dover Strait in January 2002, the MAIB made the following recommendation to the MCA:

Issue guidance on how operators should determine a safe speed and a close-quarters situation in restricted visibility by:

- *Listing the factors to take into account, in addition to those prescribed in Rule 6 of the Collision Regulations; and*
- *Defining the extent to which reliance can be placed on radar for detection of small vessels and other floating objects*.

A further MAIB recommendation, to implement the above recommendation as soon as possible, was made to the MCA following the collision between P&O *Nedlloyd Vespucci* and the sailing vessel *Wahkuna* in May 2003.

The MCA accepted this recommendation, but no guidance has yet been issued.

2.8 THE USE OF AIS FOR COLLISION AVOIDANCE

Washington Senator and *Lykes Voyager* were fitted with AIS but, other than the association of the AIS information for *Lykes Voyager* with her radar target, AIS information was not utilised further. Had the initial predicted close-quarters situation between *Lykes Voyager* and *Washington Senator* been resolved, by the early application of the COLREGS, such additional information from AIS would have been of little requirement. However, as this was not the case, the use of the AIS information was potentially beneficial.

First, had *Washington Senator*'s third officer called *Lykes Voyager* on VHF radio, using her ship name, the potential for confusion would have been much reduced. *Lykes Voyager*'s third officer would have known that the call was intended for her, as would all other ships maintaining a listening watch. This potentially would have prevented the intervention of the unidentified ship, or, if not, it might have prevented *Lykes Voyager*'s third officer from abandoning the call as she did. At the very least, the use of the ship's name would have taken away the need to transmit all of the available ARPA information, making the transmission considerably shorter.

Second, following the establishment of VHF radio communications, *Lykes Voyager*'s third officer could have used AIS to associate the originator of the initial call, *Washington Senator*, with the relevant radar target.

Finally, when *Lykes Voyager* altered course to 070°, and *Washington Senator* altered course to 200°, these manoeuvres were not immediately apparent to the other vessel, primarily due to the lag in the ARPA system. This dynamic information would have been instantly available from AIS, which **Figure 7** shows would have updated changes in the heading for both ships every 6 seconds when on a steady course, and every 2 seconds when turning. Had either master monitored this information, the manoeuvring of the other ship would have been quickly apparent, and the action taken to avoid the collision at the last-minute could have been taken sooner. Following the collision, AIS could also have been used by *Lykes Voyager* to inform other AIS fitted ships of her disabled status, namely 'not under command'.

Although the IMO and the MCA have issued guidance regarding the use of AIS, it is evident from this accident that it was not used to its full potential. This was probably due to several factors, including the absence of guidance or instruction from the ship managers. Furthermore, as indicated in MGN 277, the method of display of the AIS information was also a probable factor. It was more difficult to associate radar targets with AIS information from the 3-line Minimum Keyboard Display (MKD) on board *Lykes Voyager*, than it was using the graphical display on board *Washington Senator*. However, it is possible that the AIS information might have been most easily accessed on both ships had it been interfaced directly onto their radar displays, a facility which is now available.

2.9 THE “MAYDAY”

Following the collision, a “Mayday” was broadcast from *Lykes Voyager* using VHF radio, channel 16. *Washington Senator* was the only vessel to respond, despite others, including *Notori Dake*, the ship bound for Singapore, and the vessel or vessels which made offensive remarks, all being well within VHF range. Also, no SAR authorities ashore received the “Mayday”. This clearly illustrates the dangers of SOLAS ships continuing to use VHF channel 16 for transmitting distress alerts, rather than DSC, which would have alerted both the SAR authorities ashore and all SOLAS vessels in the vicinity. It was fortunate on this occasion that the damage to *Lykes Voyager* did not threaten the integrity of the vessel or the safety of her crew to the extent that external assistance was required.

This accident is one of several recently investigated by the MAIB in which VHF radio channel 16 has been used as a means of distress by SOLAS vessels, instead of DSC. It is possible that, as VHF radio channel 16 was used for this purpose for many years before the introduction of GMDSS, many established seafarers are having difficulty with the transition to the new system. It is also possible that masters are reluctant to activate shore SAR authorities before they have determined if their assistance is required.

The habitual use of channel 16 for transmitting distress alerts might be difficult to break, particularly as seafarers are aware that all SOLAS ships are still required to maintain a listening watch on this channel. However, it is important that this difficulty be addressed quickly. This accident clearly shows that a request for assistance sent via VHF radio, might not be heard, or even worse, not answered.

2.10 LOOKOUT ON BOARD *NOTORI DAKE*

It can be seen from **Figure 4** that *Notori Dake* was only about 1.5 miles from *Washington Senator* and *Lykes Voyager* when they collided. It is, therefore, extremely surprising that none of her bridge team, which included her master, recollect detecting and plotting either of the ships, given the configuration of the radar displays and the range scales in use. The large number of fishing vessels the ship might have encountered during the morning of 8 April 2005, some of which were possibly pair trawling, are all likely to have been relatively slow moving. A laden 34617grt container ship approaching off the port bow, and a laden 23540grt container ship overtaking on the port quarter, would not only have been of interest, but would also have been conspicuous radar targets, particularly given the good radar conditions. As they were also travelling at 17 knots and 19.5 knots respectively, they would have been much faster than other, smaller traffic in the area. The bridge team also did not hear any of the VHF transmissions related to the collision on either of the two VHF radios tuned to

channel 16. These included the transmissions from *Washington Senator*, *Lykes Voyager* and the unidentified third ship before the accident, and the “Mayday” calls from *Lykes Voyager* and *Washington Senator’*s response, after the collision. As *Notori Dake* was in VHF radio range during these transmissions, there is no obvious reason why the transmission should not have been heard, provided the VHF radios were working correctly. Therefore, considerable doubt exists on the standard of radar and aural lookout maintained by *Notori Dake* during this period.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES

1. It is possible that the performance of *Lykes Voyager*'s master was affected by fatigue, due to cargo delays, restricted visibility, concentrations of fishing vessels, a need to accompany the inexperienced third officer on the bridge, and his inability to sleep during the opportunities available. [2.2]

2. During the VHF conversation in which the master of *Washington Senator* agreed to a starboard to starboard passing arrangement, it is evident that the person the master was talking to was on board another, unidentified ship, not *Lykes Voyager*. [2.3]

3. Shortly after *Lykes Voyager* had altered course to starboard to avoid *Washington Senator*, and *Washington Senator* had altered course to port in accordance with the passing arrangement agreed with the unidentified ship, which the master of *Washington Senator* assumed to be *Lykes Voyager,* the ships were on a collision course. By the time the masters realised what had happened, the distance between the ships had reduced to the extent that the last-minute avoiding action taken by both ships was unable to prevent the collision. [2.3]

4. The traffic situation, although complicated by reduced visibility, was not unusual, and could have been resolved solely by the correct application of the COLREGS. However, the master of *Washington Senator* opted to contact *Lykes Voyager* on VHF radio. [2.4]

5. By the time VHF communications had been established between *Washington Senator* and *Lykes Voyager*, the ships were less than 5 miles apart. [2.4]

6. Had proper identification procedures been followed, the identity of the ship with which the passing agreement was made, which was probably one of many within VHF radio range, would have been established. [2.4]

7. This collision provides excellent illustrations of the dangers of using VHF radio for collision avoidance, particularly: the perils of manoeuvring contrary to the requirements of the COLREGS; the loss of valuable time when relaying messages instead of complying with the COLREGS; and the uncertainties in the identification of vessels. [2.4]

8. The avoiding action taken by *Lykes Voyager* was not taken until the ships had closed to about 2.5 miles. This was due to the inexperience of the third officer who focused on avoiding *Notori Dake*, and because the master had been distracted. [2.5]

9. During the period prior to the collision, the master of *Washington Senator* had not been informed of the reduced visibility as required by his orders, and between about 0910 and 0935, there was a misunderstanding between the master and third officer regarding who had the con. [2.6]

10. The masters of *Washington Senator, Lykes Voyager* and *Notori Dake* did not consider it necessary to reduce speed below their required passage speeds, when both restricted visibility and large concentrations of fishing vessels were encountered. In the experience of the MAIB, their decisions with regard to speed would have been made by many masters in similar situations. [2.7]

11. Further guidance is required to help masters determine a safe speed to cover factors such as the determination of a minimum acceptable CPA, and advice to vessels which are unable to proceed at a speed which allows them to be stopped within the prevailing visibility. [2.7]

12. Although AIS information would have provided near real-time warning of changes in each others' heading, this information was not used by either ship. This was probably due to several factors, including the absence of guidance or instruction from the ship managers, and the method in which the information was displayed. [2.8]

13. This accident is one of several recently investigated by the MAIB in which VHF radio channel 16 has been used as a means of distress by SOLAS vessels, instead of DSC. The "Mayday" was not received by a shore SAR authority and, although several ships were in the vicinity, only *Washington Senator* responded. [2.9]

14. Considerable doubt exists on the standard of radar and aural lookout maintained by *Notori Dake* during this period. [2.10]

SECTION 4 - ACTION TAKEN

NSB

NSB has circulated a brief summary of the collision to its ships in the April edition of its 'Fleet News'. The company has also stated its intention to:

- Develop by the end of 2006 its own bridge simulator for the training of its ships' crews.
- Increase the frequency of Bridge Team Management training for its European and Asian captains and officers.
- Install simplified voyage data recorders on its vessels which do not already have voyage data recorders installed, and to use the information recorded by this equipment during internal audits.

Anglo-Eastern Shipmanagement Ltd

The ship manager for *Lykes Voyager* has:

- Provided graphical display AIS to all its ships, and arranged for AIS data to be integrated with ECDIS displays where compatible.
- Issued a summary report of the accident to its ships.
- Arranged for the third officer of *Lykes Voyager* to attend a Bridge Team Management course.
- Arranged for the accident to be used as a teaching aid in its ships' simulator in Mumbai.

Wallem Shipmanagement Ltd

The ship manager for *Notori Dake* reminded all vessels under its management of the master and OOW's obligations with respect to:

- Keeping a good listening watch on VHF radio channel 16.
- The importance of efficient lookout by all available means.
- Checking the performance of all equipment such as ARPA and AIS.

The company has also amended its Bridge Procedures Manual with respect to not using VHF radio for collision avoidance, and the benefits of AIS as an aid for collision avoidance.

SECTION 5 - RECOMMENDATIONS

The MCA, Federal Ministry of Transport, Building and Housing, IAMI and AMETIAP are recommended to:

2006/101 Re-emphasise, through training and certification, that the use of VHF
102 radio in collision avoidance is to be avoided, and that any action taken
103 to avoid a collision or close-quarters situation must be taken in
104 accordance with the COLREGS.

The MCA and Federal Ministry of Transport, Building and Housing are also recommended to:

2006/105 Develop and promulgate additional guidance to that contained in Rule 6
106 of the COLREGS, on the determination of safe speed, and to raise the need for the provision of such additional guidance with IMO.

IAMI and AMETIAP are also recommended to:

2006/107 Highlight during training, the importance of using ships' names or call
108 signs during each transmission when communicating by radio, and the usefulness of AIS information with regard to identification, heading and speed of other AIS fitted vessels.

The International Chamber of Shipping is requested to:

2006/109 Encourage ship managers, through its national ship owner associations, to ensure masters are complying with the requirement to proceed at a safe speed by the random sampling of ships' navigational records, including VDRs.

2006/110 Bring to the attention of its national ship owner associations the advantages of displaying AIS information in a format in which it can be readily associated with radar and other sources of navigational information.

Marine Accident Investigation Branch
February 2006