

Report on the investigation of the collision between

Audacity

and

Leonis

in the approaches to the River Humber on

14 April 2007

Marine Accident Investigation Branch
Carlton House
Carlton Place
Southampton
United Kingdom
SO15 2DZ

Report No 2/2008
January 2008

Extract from
The United Kingdom Merchant Shipping
(Accident Reporting and Investigation)
Regulations 2005 – Regulation 5:

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

NOTE

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

Further printed copies can be obtained via our postal address, or alternatively by:

Email: maib@dft.gsi.gov.uk

Tel: 023 8039 5500

Fax: 023 8023 2459

All reports can also be found at our website:

www.maib.gov.uk

CONTENTS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

Page

SYNOPSIS 1

SECTION 1 - FACTUAL INFORMATION 3

1.1	Particulars of vessels and accident	3
1.2	Background information	4
1.2.1	<i>Audacity</i>	4
1.2.2	<i>Leonis</i>	4
1.2.3	Associated British Ports Humber Estuary Services - Vessel Traffic Services	4
1.2.4	Traffic operating in the VTS area	5
1.3	Narrative	7
1.4	Environmental conditions	11
1.5	Events after the collision	12
1.6	Extracts from VTS/VDR evidence	12
1.6.1	VHF – visibility reports from vessels	12
1.7	<i>Audacity</i>	12
1.7.1	Manning	12
1.7.2	Master	15
1.7.3	Pilot	15
1.7.4	Safety Management System	15
1.8	<i>Leonis</i>	15
1.8.1	Manning	15
1.8.2	Master	16
1.8.3	Pilot	16
1.8.4	Master/pilot exchange	16
1.8.5	Safety Management System	17
1.9	Vessel Traffic Service	18
1.9.1	The need for a VTS	18
1.9.2	VTS designation	18
1.9.3	Direction of vessels	18
1.9.4	Watch manning levels	20
1.9.5	Duties	21
1.9.6	Speed limit	21
1.9.7	Procedures in restricted visibility	21
1.9.8	Use of standard vocabulary	22
1.10	VTS Management	22
1.10.1	Safety Management Systems	22
1.10.2	HES risk assessment	22

SECTION 2 - ANALYSIS 24

2.1	Aim	24
2.2	Fatigue	24
2.3	Similar accidents	24
2.4	VDR information	25
2.5	Humber Estuary Services	25
2.5.1	Port Marine Safety Code (PMSC) Audit	25
2.5.2	Risk assessment	26

2.6	Humber VTS Operations	26
2.6.1	Service provided by VTS Humber	26
2.6.2	Information broadcasts	27
2.6.3	Preservation of records	28
2.7	<i>Leonis</i>	28
2.7.1	Master / pilot exchange	28
2.7.2	Bridge Team Management	28
2.7.3	Assessment of risk of collision	28
2.8	<i>Main Highway</i>	29
2.8.1	Actions of <i>Main Highway</i>	29
2.9	<i>Audacity</i>	30
2.9.1	Master / pilot relationship	30
2.9.2	Bridge Team Management	30
2.10	Communications	30
2.10.1	VTS / <i>Leonis</i>	30
2.10.2	VTS / <i>Audacity</i>	32
2.10.3	<i>Leonis</i> / <i>Audacity</i>	32
2.10.4	VTS / other vessels	33
2.10.5	Master / coxswain exchange	33
2.11	Pilot / coxswain briefing	34
SECTION 3 - CONCLUSIONS		35
3.1	Safety issues directly contributing to the accident which have resulted in recommendations	35
3.2	Other safety issues identified during the investigation also leading to recommendations	35
3.3	Safety issues identified during the investigation which have not resulted in recommendations but have been addressed	35
SECTION 4 - ACTION TAKEN (OR TO BE TAKEN)		37
4.1	By the management of <i>Leonis</i>	37
4.2	By the management of <i>Audacity</i>	37
4.3	By Humber Estuary Services	37
SECTION 5 - RECOMMENDATIONS		38

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AB	-	Able Bodied seaman
ABP	-	Associated British Ports
AHM	-	Assistant Harbour Master
ALRS	-	Admiralty List of Radio Signals
ARPA	-	Automatic Radar Plotting Aid
BPM	-	Bridge Procedures Manual
Cable	-	0.1 nautical mile
COG	-	Course over Ground
COLREGs	-	International Regulations for Preventing Collisions at Sea 1972 as amended
con	-	Control of Navigation
ECDIS	-	Electronic Chart Display and Information System
HES	-	Humber Estuary Services
IALA	-	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	-	International Maritime Organization
INS	-	Information Service
IOT	-	Immingham Oil Terminal
ISM Code	-	International Management Code for the Safe Operation of Ships and for Pollution Prevention
kts	-	knots
kW	-	Kilowatt
LR	-	Lloyd's Register
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
MSC	-	Maritime Safety Committee (of IMO)
MSN	-	Merchant Shipping Notice

NAS	-	Navigation Assistance Service
OOW	-	Officer of the Watch
OS	-	Ordinary Seaman
P & I	-	Protection and Indemnity
PAVIS	-	Port and Vessel Information System
PEC	-	Pilotage Exemption Certificate
PMSC	-	Port Marine Safety Code
SMCP	-	Standard Maritime Communication Phrases (IMO)
SMS	-	Safety Management System
SOG	-	Speed over Ground
SOLAS	-	International Convention for the Safety of Life at Sea
STCW	-	Standards of Training, Certification and Watchkeeping for Seafarers
TOS	-	Traffic Organisation Service
TSS	-	Traffic Separation Scheme
UKHO	-	United Kingdom Hydrographic Office
UTC	-	Universal Co-ordinated Time
VDR	-	Voyage Data Recorder
VHF	-	Very High Frequency
VTs	-	Vessel Traffic Services
VTsO	-	Vessel Traffic Service Operator

All times in this report are UTC + 1

SYNOPSIS

At 1351 on 14 April 2007, the UK registered product tanker *Audacity* was involved in a collision with the Panama registered general cargo ship *Leonis*, in very poor visibility, in the precautionary area at the entrance to the River Humber. Both vessels sustained damage to their bows. Fortunately there were no injuries and no pollution was caused.

Audacity had been outward bound from Immingham Oil Terminal and was approaching the precautionary area in order to disembark her pilot. *Leonis* had entered the precautionary area from seaward and had just completed embarking her pilot.

The MAIB investigation found that the operation of the bridge team on *Audacity* was inadequate, and the extent of the VTS area and VTS powers was not clearly understood by the VTS operators.

The investigation identified contributing factors to the accident; these included:

- The pilots and bridge teams, on both vessels, did not make a full assessment of the risk of collision.
- VTS procedures for managing traffic in the precautionary area were insufficient.
- VTS operators were unaware of the poor visibility in parts of the VTS area.
- Humber VTS did not have a formal operating procedure for periods of reduced visibility.
- Communications were poor.
- The Port Authority misunderstood how risk assessment could be used to improve the effectiveness of the VTS operations.

As a result of this accident, Associated British Ports Humber Estuary Services (ABP HES) has taken several actions to improve the performance of the VTS, pilots and pilot boarding operations.

Recommendations have been made to: the UK Major Ports Group/British Ports Association regarding the situational awareness of pilots immediately prior to boarding vessels; and to the ABP Group to develop policies covering headline issues, which can be implemented and monitored in all ports within the Group.



Audacity

Photo courtesy of Mar Per S.A.M.



Leonis

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF VESSELS AND ACCIDENT

Vessel details

***Audacity* (Photograph 1)**

Registered owner	:	F.T Everard Shipping Ltd
Registered operator	:	F.T Everard & Sons Ltd
Port of registry	:	London
Flag	:	United Kingdom
Type	:	Clean Oil Product Tanker
Built	:	1997 Singapore
Classification society	:	Lloyd's Register (LR)
Construction	:	Steel
Length overall	:	88.76m
Gross tonnage	:	2,965
Engine power and/or type	:	1 x 2,000kW. Ulstein Bergen AS
Service speed	:	11.50 kts
Other relevant info	:	Controllable Pitch Right Hand Propeller 1 Bow thruster @ 350kW High lift rudder

Vessel details

***Leonis* (Photograph 2)**

Registered owner	:	Prebbel Properties Group
Registered operator	:	MarPer S.A.M
Port of registry	:	Panama
Flag	:	Panama
Type	:	General Cargo Ship
Built	:	2004 Zhejiang China
Classification society	:	RINA
Construction	:	Steel
Length overall	:	112.76m
Gross tonnage	:	4,649
Engine power and/or type	:	1 x 2,059kW. "Guangzhou Diesel"
Service speed	:	14.00 kts

Accident details

Time and date	:	1351 Local Time (UTC +1) on 14 April 2007
Location of incident	:	Precautionary area approaching Spurn Point
Injuries/fatalities	:	No injuries or fatalities
Damage	:	Both vessels suffered significant bow damage.

1.2 BACKGROUND INFORMATION

1.2.1 *Audacity*

At the time of the accident, *Audacity* was owned by F.T Everard Shipping Ltd and operated by F.T Everard & Sons Ltd. A transfer of ownership and management to James Fisher and Sons Ltd was in progress.

Audacity had just spent 2 weeks in a dry dock at Sunderland, where scheduled maintenance and repairs had been undertaken. Work at this time included an upgrade to the vessel's Electronic Chart Display and Information System (ECDIS), however it had not been possible to commission the equipment and, as a consequence, the ECDIS was not in operation at the time of the accident.

On completion of the dry docking, *Audacity* was chartered to load a cargo of gas oil at Immingham for discharge at Aberdeen. The short voyage from Sunderland to Immingham was uneventful.

Audacity was fitted with a high lift rudder and was reported to be responsive to her helm down to speeds as low as 2.0 kts. She was also equipped with a controllable pitch propeller which would swing the bow to port when the pitch was placed astern.

Cargo operations at Immingham were completed early on the evening of 13 April, but sailing was delayed due to restricted visibility throughout the area.

1.2.2 *Leonis*

Leonis was owned by Prebble Properties Group Inc. and operated by MarPer S.A.M, based in Monaco, and traded worldwide. Prior to the accident, she had loaded bulk bauxite ore in Venezuela for discharge at Rotterdam and Grimsby. The passage from Venezuela had been uneventful and cargo operations at Rotterdam had gone smoothly.

Leonis left Rotterdam during the evening of 13 April, and arrived at the Humber outer anchorage the following morning.

1.2.3 Associated British Ports Humber Estuary Services - Vessel Traffic Services (Photograph 3)

Associated British Ports (ABP) was the Competent Harbour Authority for the Humber, as defined by the Pilotage Act 1987, at the time of the accident. However, many of the duties and responsibilities of ABP have been delegated to Associated British Ports, Humber Estuary Services (ABP HES) whose role was to provide vessel traffic services and an efficient pilotage service for the area.

VTS Humber operating service levels are designated in MSN 1796 (**Annex 1**). These levels are:

TOS – a traffic organisation service: A service to prevent the development of dangerous maritime traffic situations and provide for the safe and efficient movement of vessel traffic within the VTS area.

INS – an information service: A service to ensure that essential decision making information becomes available in time for onboard navigational decision making.

The requirement for a port to decide if there is a need to establish a VTS is contained in SOLAS Chapter V, regulation 12. Additional guidance in the operation of VTS is given in MGN 238, 239, 240 (**Annexes 2, 3 and 4**).

Photograph 3



VTS Humber

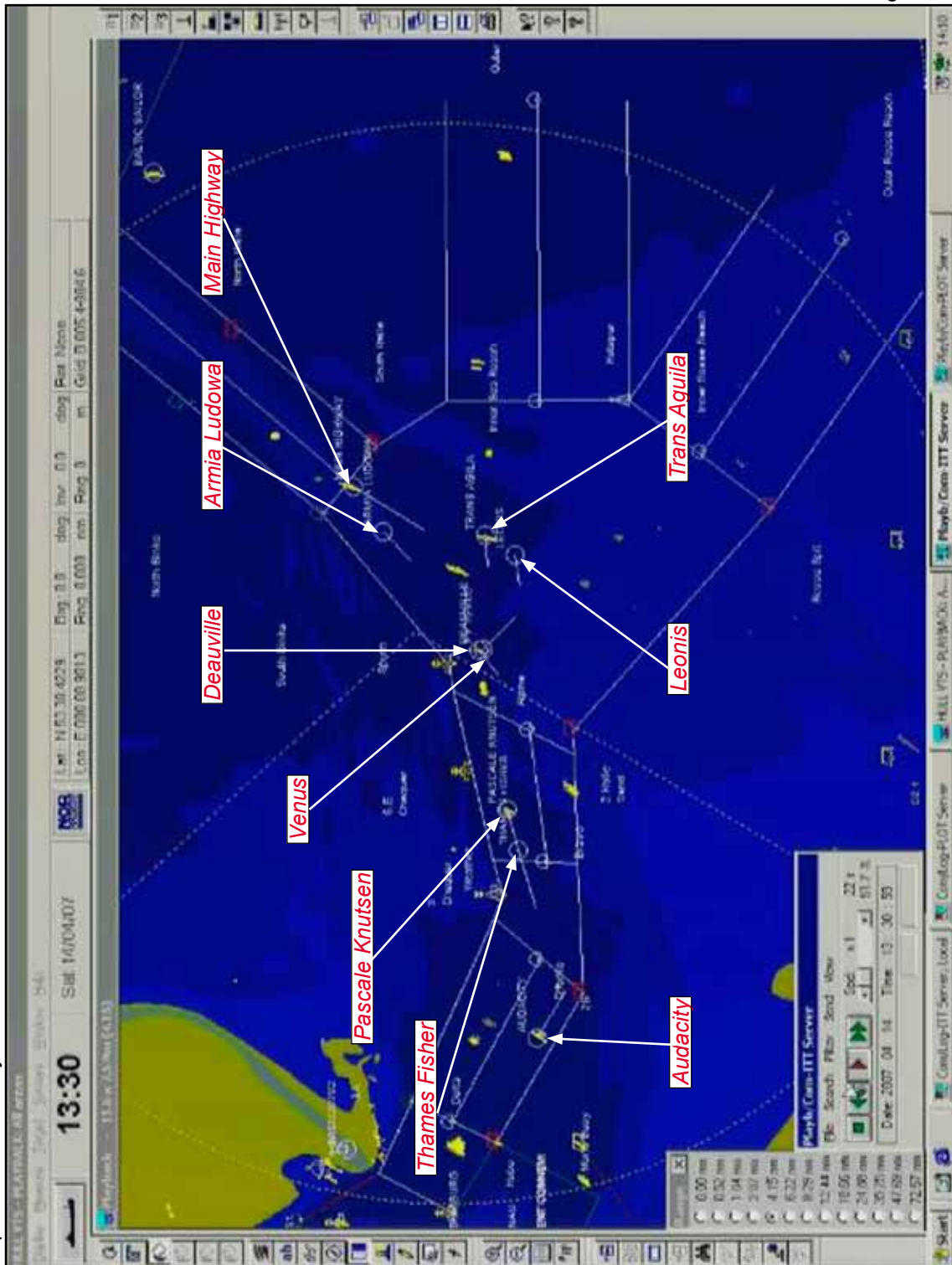
1.2.4 Traffic operating in the VTS area

There was a total of eight vessels operating in the area at the time of the collision, these were:

Vessel	Type	Designation	Pilot boarding time
<i>Thames Fisher</i>	Tanker	Inbound No1	1315
<i>Pascale Knutsen</i>	Tanker	Inbound No2	1315
<i>Deauville</i>	LPG	Inbound No3	1330
<i>Armia Ludowa</i>	Bulk	Inbound No4	1330
<i>Trans Aguila</i>	General	Inbound No5	1330
<i>Leonis</i>	Bulk	Inbound No6	1330
<i>Main Highway</i>	Car Carrier	Inbound Pilot Exempt	n/a
<i>Audacity</i>	Tanker	Outbound	already on board

The positions of these vessels at 1330 are shown on a chartlet of the VTS area (**Figure 1**). The turn allocated to each vessel to embark a pilot was determined both by time of arrival and the vessel's final destination. As can be seen at **Figure 1**, at 1330 *Armia Ludowa* and *Trans Aquila* are further from the pilot boarding area than *Leonis*, however they were scheduled to embark a pilot before *Leonis* due to the latter's shorter river transit.

Figure 1



VTS Humber screen shot at 13:30

Reproduced courtesy of ABP Humber

1.3 NARRATIVE

On the evening of 13 April, *Audacity* completed loading a full cargo of gas oil at Immingham Oil Terminal, berth No 8. Cargo calculations and documentation were completed and a pilot requested. On his arrival on board the vessel, the pilot informed the master that the visibility was too poor to allow *Audacity* to leave her berth.

The port regulations applicable to the Humber stated that, for vessels carrying dangerous cargo in bulk, a minimum visibility of 0.5 mile throughout the intended route was required before sailing from a berth within the port limits.

The pilot remained on the bridge of *Audacity* in the hope that there might be some improvement, but the visibility continued to worsen, until at 0200 the sailing was cancelled, awaiting improved visibility in the morning, and the pilot left the vessel.

During this period of poor visibility three restricted inbound vessels arrived in the VTS area. The VTS operator instructed the vessels to anchor until the visibility improved. Also at anchor, awaiting the tide, was the large bulk carrier *Armia Ludowa*.

At 0830 on 14 April, *Leonis* arrived within the port limits of the Humber from Rotterdam; at this time the visibility in the approaches to the anchorage was less than 3 cables. The master reported his arrival to the VTS operator and was advised to anchor his vessel and await the tide. He was also informed that a pilot would embark *Leonis* at 1330.

Visibility slowly improved during the morning until at 1100 VTS Humber resumed the movement of vessels carrying dangerous cargo. A pilot boarded *Audacity* at 1135 and there was time for a concise master / pilot exchange before unmooring commenced at 1148. The last mooring line was clear at 1152.

At 1204, after completion of unmooring and tidying up of the aft station, the second officer proceeded to the bridge to report for his watch. The master decided to send him back down to get his midday meal and told the second officer that he did not require him to return to the bridge until after the pilot had been disembarked. The result of this decision was that the bridge team of *Audacity* consisted of only the master and the pilot throughout the passage from the Immingham Oil Terminal to the precautionary area.

After clearing the berth, *Audacity* headed downriver and the master engaged auto pilot and ordered the engines full ahead. This gave a speed over the ground of about 10.0 kts. Master and pilot both used radar to monitor the vessel's progress, the master using the starboard radar display and the pilot the port. Both radars were the same make and model and equipped with ARPA facilities. However, neither the master nor the pilot used the radar's ARPA function to routinely acquire or track targets. Visibility at this time was about 1 mile.

Because of the prevailing poor visibility at the anchorage the master of *Leonis* decided to allow himself plenty of time to pick up the anchor and proceed at slow speed to the pilot boarding area 8.5 miles away. The anchor party began heaving the anchor at 1210, and by 1219 the anchor was away. At this time the master called Humber VTS to confirm the boarding time was still scheduled for 1330.

Once Humber VTS had decided the visibility in the area had improved sufficiently, the three vessels carrying dangerous cargo in bulk, which were waiting for pilots at the anchorage, were instructed to heave up their anchors in time to arrive in the pilot embarkation area between 1315 and 1330. The time that vessels would need to heave up anchor to arrive at the boarding area in accordance with this instruction was left to each master's discretion. At 1213, *Thames Fisher* reported to VTS Humber that they were underway, *Deauville* reported at 1220 and *Pascale Knutsen* at 1221.

Just after the last of these vessels reported they were underway, a report was made to the VTS operator, from a vessel anchored off Immingham, that the visibility in that area was less than 1 cable. The VTS operator acknowledged this report without further comment.

At 1228 *Trans Aguila* called VTS Humber to give 1 hour's notice of arrival at the pilot boarding area.

At 1233 *Thames Fisher* passed the "outer sea reach" reporting position and contacted the VTS operator, who cautioned that the vessel should not arrive at the pilot boarding area too early as her pilot was not scheduled to board until 1315.

At 1238 *Pascale Knutsen* reported in at the same position and the message was acknowledged without further comment. From available records it would appear that no report was made by *Deauville* when passing the "Outer Binks" reporting position or, *Leonis*, when she passed the "outer sea reach" reporting position.

At 1245 *Armia Ludowa* reported to VTS Humber that the vessel was underway from the anchorage, and a further report was made at 1306 when passing "Outer Binks".

At 1259 the VTS operator advised the pilot on board *Audacity* that pilot launch *Venus* had been assigned to conduct his disembarkation. However, the operator stated that as she had to embark pilots onto six vessels before that, she may be delayed. It was then left to the pilot's discretion to monitor VHF transmissions between the pilot launch and the vessels being boarded, and to adjust *Audacity's* speed to arrive after the last vessel boarding had been completed.

At 1303, a routine marine and safety information broadcast was transmitted on channel 12; this included navigation information and visibility reports, including that there was "nothing below 1 mile between Spurn Point and the Humber Bridge". Shortly after this broadcast ended, a vessel called the VTS on channel 12 to report there was reduced visibility in the Bull Channel, of between 100 to 200 metres.

At 1306, *Audacity* also reported "zero visibility" in the Bull Channel. In reply to *Audacity*, the VTS operator informed him that it was an isolated patch, and about 5 minutes later, visibility in the vicinity of *Audacity's* position improved to 6 or 7 cables.

In addition to the vessels that were required to embark and disembark pilots, the vehicle carrier *Main Highway* was proceeding inbound to the Humber and transiting the precautionary area. Her master held a pilotage exemption certificate (PEC) for the Humber and therefore was not required to embark a pilot before proceeding to her berth.

The sequence for placing pilots on the inbound vessels and taking the pilot off *Audacity* was set by the VTS operator. This relied on all six pilots boarding their respective vessels in sequence from the same pilot launch, *Venus*, during a 15 minute window, after which the launch would proceed to *Audacity* to disembark her pilot. In such situations, it was not routine for the VTS operator to inform vessels of the overall pilot boarding plan unless this was specifically requested. Accordingly, the master of *Leonis* was not specifically informed of the plan.

After entering the precautionary area at 1320, the master of *Leonis* informed the VTS operator that his vessel was 1 mile from the pilot boarding ground and asked for confirmation that a pilot would be available at 1330. In response, the VTS operator informed the master of *Leonis* that his pilot turn would be number six, that his vessel would embark a pilot after *Trans Aguila* and that he should reduce his speed “slightly”. The reason for this request was that *Trans Aguila* was astern of *Leonis*; however this was not explained to the master so he continued inbound keeping a safe distance ahead of the vessel on his starboard quarter, which was *Trans Aguila*.

At 1321 the first of the six inbound vessels, the tanker *Thames Fisher*, was approached by the pilot launch, and pilot embarkation operations commenced.

Despite being advised to reduce speed slightly, *Leonis* still arrived at the pilot station at precisely 1330, with *Armia Ludowa* and *Trans Aguila* yet to take their pilots (**Figure 1**). As there was no pilot available, the master decided to stop the engines and allow *Leonis* to run on to the west at about 5½ kts heading 282°, carried by the ship’s way and tidal stream.

Shortly after this time, *Audacity* was passing “Charlie” buoy, still proceeding at 10.0 kts, at which point she then began to reduce speed in preparation for her rendezvous with *P/L Venus*. Visibility had again reduced to about 1 cable, however there was no consideration given to summoning an additional officer or crew member to the bridge, nor was the sounding of fog signals commenced. No report on the poor visibility was made to VTS Humber.

At 1335, the master of *Leonis* realised his vessel was being quickly set towards the west south west, and he decided to turn *Leonis* to starboard, towards the north, in order to stem the tidal stream and maintain the vessel’s position. At this time, *Main Highway* was closing with *Leonis* as the vehicle carrier transited the precautionary area at about 8.2 kts. The master of *Leonis* initially misidentified the closing radar target as *Armia Ludowa*. Unsure about the intentions of the approaching vessel, the master of *Leonis* made a call to *Armia Ludowa* on VHF channel 13. *Armia Ludowa* responded, and it was agreed that the vessel would overtake to port of *Leonis*. Being satisfied with the arrangement, the master of *Leonis* allowed his vessel to continue its swing to starboard and then settle on a heading of 355°.

At 1338, the master of *Leonis* became concerned that the radar target of the vessel he had assumed to be *Armia Ludowa* indicated that the vessel was not taking the action as agreed during the earlier exchange by VHF. On comparing radar and AIS information, he realised that the approaching target was in fact *Main Highway*. He quickly contacted the master of *Main Highway* using VHF channel 13 who advised him

of his intention to pass to the north of *Leonis*. As a consequence, the master of *Leonis* placed the helm to port and, shortly afterwards, *Main Highway* passed to starboard at a distance of 2½ cables. This manoeuvre resulted in *Leonis* settling on a course of 245° with her engine stopped, which, combined with the effect of the tidal stream, caused her to move toward the exit of the outbound traffic lane.

By now, the fifth pilot had been embarked from the pilot launch, and *Venus* therefore began to head towards *Leonis*.

At 1341 the coxswain of *Venus* called the master of *Leonis* on VHF channel 13 and informed him that the pilot launch was approaching the vessel's port side from astern. The coxswain requested that the speed of *Leonis* be reduced to 6 kts to facilitate boarding of the pilot.

Before the pilot boarded *Leonis*, he consulted the pilot launch's radar. In accordance with the coxswain's preference, the radar's display was set on a 1-mile range with the ship's head up. In discussion with the coxswain, it was agreed that a target that was painting clearly at a range of about 0.9nm was the "Alpha" buoy. No outbound traffic was visible as *Audacity* was still more than 1 mile away at this stage.

At 1343 the coxswain of the pilot launch called *Leonis* by VHF to advise that the pilot was on board and that the vessel should "go back on course". This message had to be repeated because the master of *Leonis* was confused by the instruction. After receiving the repeated instruction to "go back on course" the master assumed the course to follow was his initial course, and brought *Leonis* round onto a heading of 282°, although she was still drifting under the tidal influence to the south west. Due to the confusion over the instruction to "go back on course" the master had missed the start of the message. He was therefore unaware that the pilot was on board and continued monitoring channel 13, awaiting further instructions.

When the embarkation of the pilot was complete, the coxswain reported this to the VTS operator, using Humber VTS private VHF channel – Ch 50. He then proceeded towards *Audacity* to disembark her pilot.

Audacity, proceeding at a reduced speed of 8.5 kts, passed the "Bravo" buoy at about the same time that the pilot boarded *Leonis*. The visibility in the area had reduced to 1-2 cables, and it was at this stage, with the vessels 2 miles apart, that the master on *Audacity* first began to systematically monitor the target of the approaching vessel. After the radar target of *Leonis* had been acquired, the master noted that an initial CPA of 2 cables to starboard was predicted. Therefore, the speed of *Audacity* was reduced to about 6 kts at the request of the pilot to provide more separation with the vessels which were embarking their pilots. But the effect of this manoeuvre on the CPA with *Leonis* was not checked by either master or the pilot.

As the pilot on board *Leonis* made his way to the bridge, *Audacity's* pilot attempted to call *Leonis* on VHF channel 14, but without reply. On reaching the bridge, *Leonis's* pilot became disoriented. The radars on the bridge were set up differently to his preferred settings, and he spent some time adjusting these before he realised that the vessel was positioned further south west in the channel than was normal and was much closer to No 2 Haille Sand buoy than he had expected from the orientation on board the pilot launch.

Once the pilot on *Leonis* had re-assessed the situation, his priority was to move her to the north, so he ordered the wheel to starboard and engines ahead - it was only then that he became aware of an outbound vessel.

He then reported to the VTS operator, advising him of his position and intention to head towards the north west to enter the inbound TSS. At the end of this report he asked what the outbound vessel's name was. The VTS operator informed him that it was *Audacity* and her pilot had been calling him on channel 14. Direct communication was established between the two pilots.

At the time the pilots began communicating with each other, the vessels were 5 cables apart and closing at a combined speed of about 10.0 kts. *Audacity's* master had realised that a close quarters situation was developing and that hand-steering was required. Instead of calling additional personnel to the bridge he engaged the hand-steering and placed himself on the wheel. This left the con solely with the pilot, without the support of a bridge team.

When the two pilots spoke to each other, *Audacity's* pilot informed *Leonis* that he was approaching the Haille Sand buoy and intended "to go up" (north) through the New Sand Hole. The pilot of *Leonis* then informed the pilot of *Audacity* that he thought he was "possibly right ahead" of him and that he was turning the vessel to starboard (north westerly) towards the "Alpha" buoy; there was a period of silence, after which *Audacity's* pilot said he would take his way off and "come down to the south".

Before he carried out the agreed actions, the pilot of *Audacity* became distracted by a radio exchange with the coxswain of the pilot launch about the arrangement for his disembarkation. The coxswain was informed that the pilot did not intend to leave *Audacity* until the vessel was clear of *Leonis*. Throughout this conversation no action was taken to increase the CPA with *Leonis*.

Very shortly after the conversation ended, *Audacity* and *Leonis* came in sight of each other and it was realised by both bridge teams that a collision was probable and imminent. Although the engines of both vessels were placed full astern, they collided, bow to bow, at 1351 in position Lat 53° 32.5 N Long 000° 13.6 W; this position is 2.5 cables NE of the No 2 Haille Sand port hand buoy, close to the exit from the eastbound lane of the traffic separation scheme. The combined speed at the time of impact was approximately 8.5 kts.

1.4 ENVIRONMENTAL CONDITIONS

Weather conditions at the time of the accident were as follows:

Wind	N x E 3
Sea / swell	Low and slight
Tide	1.5 – 2.0 kts from the north east
Visibility	Poor to very poor, fog patches

1.5 EVENTS AFTER THE COLLISION

Audacity continued to operate her engines astern until she was stopped in the water. Engines were then stopped. The pilot immediately reported the collision to the VTS operator, who acknowledged the report. Damage was assessed and there were no indications of water ingress. There was damage to the bow flare and two holes into the forecastle space (**Photograph 4**). It was decided by the pilot and the VTS operator to proceed to the Bull anchorage to conduct a fuller assessment, and the owners were contacted. The vessel's Flag State, P&I insurers, and classification society were all informed of the accident.

Leonis continued to operate her engines astern until clear of *Audacity*. It was then noted that the vessel was being set onto the No 2 Haille Sand buoy so the pilot used helm and engines to manoeuvre away from the buoy. Damage was assessed and reported to the VTS operator. As there was no damage to the bow beneath the water line (**Photograph 5**), and no evidence of pollution, permission was given for *Leonis* to continue the passage into Grimsby.

Leonis's SMS emergency procedure required the master to report directly to her owners by phone. At the time of the incident this was only possible either by MF/HF radio or by VHF link call through a coast radio station, as the vessel was not equipped for satellite voice communications, and no mobile phone had been supplied for use in coastal areas.

As a result of the decision to continue the passage to Grimsby, the master was not able to immediately attempt to call his owners, and the vessel's Flag State, P&I insurers, and classification society were not informed.

1.6 EXTRACTS FROM VTS/VDR EVIDENCE

Records were supplied by VTS Humber that showed the tracks of all vessels in the area, including positive AIS identification, from 1300 to 1400. Tracks were over the ground and the vectors were the resultant of the combination of ships, course and speed and the effect of the tide. In addition, selected VHF records were provided covering the period from 1218 to 1451.

The VDR record was provided by *Leonis*, showing radar PPI information and a record of VHF transmissions from 1200 to 1500.

1.6.1 VHF – visibility reports from vessels

During the period leading up to the collision there were several reports made to the VTS operator concerning visibility in the area. An analysis of the likely scope of the areas of reduced visibility is shown at **Figure 2**.

1.7 AUDACITY

1.7.1 Manning

Audacity had a minimum safe manning requirement of seven, but normally carried a crew of eight. The safe manning certificate required a master, chief officer and one other deck officer. At the time of the collision, there was an additional chief engineer on board undergoing an extended handover. The configuration of the vessel's readouts



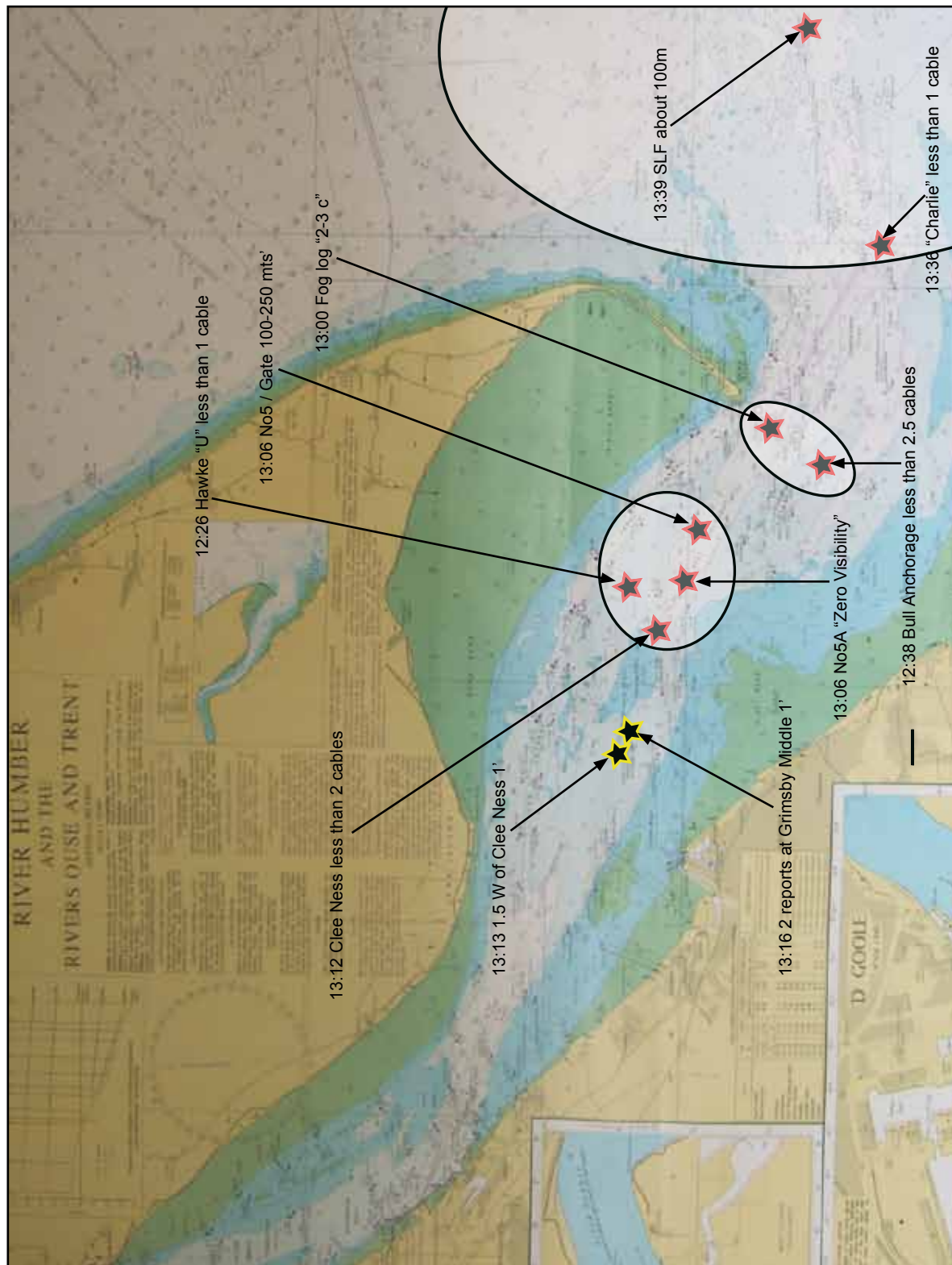
Damage to the bow of *Audacity*



Damage to *Leonis*

Figure 2

Reproduced from Admiralty Chart 109 by permission of the Controller of HMSO and the UK Hydrographic Office



for engine room data and alarms meant it was the practice for the chief engineer to be stationed on the bridge during manoeuvring, although he took no part in the navigation of the vessel.

With this manning level, the vessel was able to maintain a three watch system with the master taking the 8-12 watch. According to the watchkeeping schedules, the 2 deck officers would change to a 6 hours "on" 6 hours "off" shift pattern during port operations and manoeuvring. The master would normally take the con during manoeuvring.

Notwithstanding the availability of a well rested deck officer, the manning on the bridge of *Audacity* throughout the voyage from Immingham to the point of collision consisted of just the master and the pilot. There was no dedicated lookout.

1.7.2 Master

The British master held an STCW Class 4 certificate with a Master's Limited European Endorsement, issued by the MCA. He had been employed by the same company throughout his sea going career, joining as trainee in 1986. He gained his Master Endorsement in 1997 and was promoted to master in 2005. Initially assigned to *Audacity* earlier in 2007 for a 2 week familiarisation period with the outgoing master, he then took 2 weeks' leave before returning to take command prior to the dry dock period. After the collision, he was tested for drug and alcohol consumption as part of F.T Everard's standard post-incident procedures. The results for both were negative.

1.7.3 Pilot

The pilot on *Audacity* held a Class 1 Master Mariner CoC, which he gained in 1970. He had held command for 26 years on various vessels, including bulk carriers, car carriers and reefers on worldwide voyages. After joining the Humber pilots he gained his 3rd class authorisation in 2002, and had completed over 1000 acts of pilotage prior to this accident.

After the collision, he was tested for drugs and alcohol consumption as part of the HES standard post-incident procedures. The results for both were negative.

1.7.4 Safety Management System

On board *Audacity*, there were well documented procedures for bridge manning, which included navigation in restricted visibility. The master was familiar with the contents of the company's SMS, including its requirement for an additional officer to be on the bridge during pilotage and for a lookout to be on the bridge and the need to sound fog signals in restricted visibility.

Checklists formed part of the vessel's SMS and were routinely completed, including those for arrival and departure from the Immingham Oil Terminal. However, the company's standard checklist covering the procedures to be adopted when encountering conditions of reduced visibility was not on board the vessel and, on this occasion, the procedures were not fully implemented.

Emergency procedures were well documented and swiftly implemented after the collision. The requirements to notify stakeholders were fully and quickly followed and the response of the company was quick and effective.

Company procedures required regular appraisal of the senior officers. However, although the master had received regular appraisals when chief officer, he had not been appraised during the 2 years since his promotion to master.

1.8 LEONIS

1.8.1 Manning

Leonis had a minimum safe manning requirement of 12, but normally carried a crew of 16. The certificate required a master, chief officer and one other deck officer.

With this manning level, the vessel was able to maintain a three watch system with the master taking the 8-12 watch. However, during manoeuvring and port operations the master would be available “as required” and the deck officers would change to a 6 hours “on” 6 hours “off” routine.

The bridge was manned in accordance with company requirements, and the bridge team at the time of the accident consisted of the master, pilot, 2nd officer, helmsman, cadet and a lookout (on the forecastle head).

1.8.2 Master

The master was a Ukrainian national and held an STCW Class II/2 certificate (deep sea captain – master on ships 500grt or more) issued by the Ukraine Government. This was his first voyage with this company and his first voyage in command. He had been on board for 2 months and, prior to assuming command, had received a handover of only a few hours with the outgoing master.

1.8.3 Pilot

The pilot on *Leonis* held a British Class 1 Master Mariner certificate of competency, gained in 1971. He had served on various deep sea vessels on worldwide voyages in capacities up to chief officer. In 1972 he changed to tug operations in South Africa, and in 1984 he became a pilot in Cape Town, rising to senior pilot before leaving for the Humber in 2001. After joining the Humber pilots he gained his 3rd class authorisation in 2002, 2nd class in 2003 and 1st class in 2005. Prior to this accident he had completed over 1000 acts of pilotage without incident.

1.8.4 Master/pilot exchange

The pilot boarded *Leonis* in the precautionary area at 1343 from *P/L Venus*, and took between 4 and 5 minutes to reach the bridge. The time available for the master/pilot exchange was then limited before the close quarters situation occurred with *Audacity*.

There were two reasons for the time the pilot took to reach the bridge. These were:

- 1) There was significant condensation from the humid atmosphere, causing the pilot's hands to become wet and dirty on the pilot ladder. He had therefore requested a towel or rag to wipe his hands after he came onto the deck, but it took some time before one could be found.
- 2) Route from deck to bridge.

The pilot was taken from the main deck into the accommodation and up the stairs, via an enclosed stairwell, to the bridge. The pilot's progress was impeded because the design of the stairwell allowed just enough space for a slim and unencumbered person to pass between the stair railings and the bulkhead. In fact, this was not the most efficient way of using the stairs. There was a door at the head and foot of each flight of steps; and the correct way to use these should have been to enter the stairwell at the door at the base of the stairs, climb to the next deck, exit the stairwell into the adjacent alleyway, and re-enter at the foot of the next flight of stairs (**Photograph 6**).

The pilot was not unduly worried about the time it was taking to reach the bridge as his mental picture of the vessel's position relative to the “Alpha” buoy placed *Leonis* in a reasonable position. He was also unaware of any outbound traffic that would make his arrival on the bridge a matter of urgency.

Internal stairs within *Leonis*

1.8.5 Safety Management System

The actions on *Leonis* were compared with the requirements of the operating company's SMS.

The company's procedures had been followed and checklists were available for the arrival and departure from the anchorage; a restricted visibility checklist had been completed and the procedures implemented.

Following the collision, the company's emergency procedures were followed, however the requirements to notify stakeholders were only partially successful due to the limited means of communication available on the vessel.

The master was new to the company and had been master for only 2 months. Company familiarisation procedures in the office had been completed fully according to the SMS, however the handover and familiarisation procedures on the vessel were not, due to the unscheduled relief of the previous master, on medical grounds. Nevertheless, the master had effectively implemented the company's SMS.

1.9 VESSEL TRAFFIC SERVICE

1.9.1 The need for a VTS

The need for establishing a VTS is set out in SOLAS Ch 5 Regulation 12. Detailed guidelines are contained in IMO Resolution A.857(20) (**Annex 5**) and is also covered in the IALA VTS Manual 2002. This publication is intended to provide more detailed information to authorities, and its content is based on the principles contained in Resolution A.857 (20).

1.9.2 VTS designation

Humber VTS, between the Humber Bridge and the outer VTS area, is designated a traffic organisation service. This is defined as a “service to prevent the development of dangerous situations and to provide for the safe and efficient movement of traffic within the VTS area”.

This area and service level is promulgated in MSN 1796 (M+F) (**Annex 1**) and the Admiralty List of Radio Signals (Vol6) (ALRS).

Humber port limits and VTS area limits are indicated on chartlet **Figure 3**.

1.9.3 Direction of vessels

The VTS operatives were clear on their powers to advise, organise and direct traffic within the port limits.

All VTS operators are designated as assistant harbourmasters, and their powers are defined in the “Navigation operations manual – VTS & data centre” as:

“The power to regulate vessel traffic in the Humber, Trent and Ouse is conferred upon the Harbour Master (and through him upon all VTS operatives), by the British Transport Docks Act 1972. These powers are given effect by “general” and “special” directions to navigation and by the Humber Navigation Byelaws 1990. It is important to realise, however, that in conferring powers upon the Harbour Master, the Act also confers a duty upon him to exercise those powers. Thus, if he observes that a vessel is navigating unsafely and is, for example, about to run aground or perhaps to collide with another vessel then he has a duty to do everything in his power to prevent a mishap taking place. In doing so, however, he should avoid giving direct pilotage advice if at all possible.

In addition he has a duty to inform vessels about the condition of the river, warn them of any hazards to navigation which currently exist, and direct them to comply with the law and particularly with the Byelaws.

In the case of “Passage Plan” vessels he must ensure that they conform to the provisions of the Plan and must advise them of any serious or unwarranted departures from it.

He must provide the initial response to any serious marine emergencies which occur within the harbour and must use all of the resources available to him to contain the situation until it can be handed over to the appropriate authority. This will normally be HM Coastguard where there is a threat to human life. In the case of an oil pollution incident, this is to be dealt with by ABP as per the “Humber Clean” plan”.[sic]

The power to give instructions to vessels navigating in a VTS area is devolved from European Directive 2002/59/EC (**Annex 6**). In the UK, the power has been transposed into UK law via a Statutory Instrument - SI 2004 No 2110 (**Annex 7**). The SI requires that vessels entering a VTS operated area comply with the rules of that VTS.



1.9.4 Watch manning levels (Photograph 7)

Due to the isolated position of the VTS tower, which is located at the Spurn, the VTS operators are required to live on-site during their duty periods.

The VTS tower is constantly manned, and each watch normally consists of two qualified VTS operators, one operating channel 12, the other channel 14. They are endorsed in the VTS log as competent on the specific area of operation. At the time of the collision, there was also a trainee operator who was operating channel 14 under the supervision of one of the operators, who was additionally qualified as a VTS trainer.

VTS shift patterns are 8 hours on duty, 8 hours off duty. The basic rostering schedule follows a 5 week cycle:

- 4 days at Spurn working 6 shifts
- 4 days off duty
- 6 days at Spurn working 9 shifts
- 4 days off duty
- 4 days at Spurn working 6 shifts
- 13 days off duty.

Photograph 7



Interior of VTS Humber

1.9.5 Duties

VTS operators are also designated as assistant harbourmasters. Their routine duties are described in the HES “Navigation operations manual – VTS & data centre” (**Annex 8**) and include:

- Monitoring VTS screens for vessel movements and communication with shipping;
- Logging all vessels’ movements and relevant details on a database (PAVIS);
- Arranging pilot allocation, planning and programming vessel movements.

1.9.6 Speed limit

There were no general speed limits within HES waters other than for vessels carrying dangerous cargo in bulk, where by-laws require vessels underway in poor visibility to “proceed at slow speed and with extreme caution” (**Annex 9**). HES has recognised that, to maintain effective steerage, minimum safe speeds will depend on the characteristics of the vessel and the environmental conditions prevailing at the time. However, when passing any jetty when mooring or unmooring is taking place, a vessel must not exceed 5.0 kts.

Even in restricted visibility, the port does not impose speed limits, and it leaves this to the discretion of individual masters. Notwithstanding, HES require that vessels comply at all times with Colreg 6 (Safe Speed).

1.9.7 Procedures in restricted visibility

Visibility of 5 cables or less is stated as a cut off for vessels “carrying dangerous cargo in bulk” to navigate within the Humber. This class of vessel would be prohibited from starting passage if there were 5 cables or less visibility in any part of the intended transit from pilot to berth or berth to pilot. If underway, the decision to continue or abort rests with the bridge team, based on the information available (**Annex 9**).

However, although the reporting requirements during reduced visibility are included in the examinations for pilots and PEC holders, there are no formal procedures or guidelines for determining when such restricted visibility exists. It is understood that vessels or pilots will make reports in to the VTS operator when they become concerned about the visibility, but there were no written procedures to do so, and no range of visibility is stated when these reports should be started.

Even though the visibility in parts of the river and the precautionary area was reported as less than 0.5 nm in the period leading up to the collision between *Audacity* and *Leonis*, few reports were made to the VTS operator by pilots, the masters of vessels operating in the area, or the pilot launch.

Without systematic reports on the visibility from vessels operating in the river and its approaches, the VTS operator in the tower on Spurn Point did not appreciate that there was very restricted visibility in the pilot boarding area, and that it was likely there was a fog bank in the vicinity of the Bull Channel.

In addition to implementing the documented requirements for restriction of the movement of vessels “carrying dangerous cargo in bulk”, the VTS operators would commence recording visibility in a “Fog Log” (**Annex 10**). Although there was no formal

requirement for this record, it had become routine for it to be used by the operators whenever there was reduced visibility on the river. At 1300 the visibility at Spurn Head was recorded as 2 - 3 cables.

1.9.8 Use of standard vocabulary

An integral part of VTS operator training includes understanding and the use of IMO Standard Communication Phrases. These refer to VTS standard communications, including those to be used during the embarkation and disembarkation of pilots.

The VTS training requires that phrases used by operators should be prefaced with message markers to clearly indicate to the recipient the kind of message that will follow. There are eight markers that may be used:

- i) Instruction: The message that follows will tell you to do something
- ii) Advice: The message that follows will advise you to do something
- iii) Warning: The message that follows will tell you of a problem
- iv) Information: The message that follows will tell you something you need to know
- v) Question: The message that follows requires a reply
- vi) Answer: The message that follows is the reply to a question
- vii) Request: The message that follows will ask you for something
- viii) Intention: The message that follows will state something that will be done

1.10 VTS MANAGEMENT

1.10.1 Safety Management Systems

HES had a Safety Management System (SMS) in place as required by the Port Marine Safety Code (PMSC).

An extract of HES's VTS Operation Manual, which is incorporated into the SMS, is shown in **Annex 8**.

HES operates a system of "General Notices" which it issues to either "Pilots" or to "VTS". These notices are numbered, issued, updated and logged as circumstances dictate.

1.10.2 HES risk assessment

In September 2001, HES, in conjunction with independent risk assessment consultants, carried out a comprehensive formal safety assessment of all marine operations at Humber Estuary Services. The risk areas identified fell into the following hazard categories:

- *Collision*
- *Grounding*
- *Berthing Contact*
- *Fire and Explosion*

In 2006, a further, internal, revision of the risk assessment was conducted. Although several of the risk scenarios concluded that VTS was a “risk mitigation factor” or “existing control measure”, this was not included formally in the control measures.

There was no specific risk scenario evaluated that covered a collision involving a vessel carrying “dangerous cargo in bulk” in the precautionary area or the VTS approaches.

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 hours of work and rest for those ships' officers, pilots and VTS operators involved in this accident were reviewed. However, fatigue is not considered a factor in this accident.

2.3 SIMILAR ACCIDENTS

From available records there have been six accidents within the VTS Humber area since 1998 which have relevance to this accident:

- 1998 – Grounding in VTS Humber area off Spurn Head
 - Relevance
 - MAIB made a recommendation to ABP Humber to encourage VTS operators to be more proactive and to provide timely warnings to vessels operating in an unsafe manner.
- 2004 – Grounding in VTS Humber area
 - Relevance
 - A vessel was manoeuvring to take a pilot when she grounded. No advice or warning was given by the VTS operator and the master found communications with the pilot launch confusing.
 - As a result of this accident, General Notice to Pilots 23/2004 was issued (**Annex 11**).
- 2005 – Collision in VTS Humber area in the Humber estuary
 - Relevance
 - This was a collision where the master, a PEC holder, was conducting navigation, alone, on the bridge.
 - As a result of the collision, the vessel's owner implemented a bridge procedure that required two navigation officers (one of which should be the master) to be present on the bridge at all times when in pilotage waters.
- 2005 – Collision between pilot boat and an anchored vessel
 - Relevance
 - After embarking a pilot on board a vessel at anchor in the Humber estuary the coxswain became disorientated in dense fog. After thinking himself to be well clear of the vessel he increased speed, but then struck the side of the vessel he had just left.

- 2006 – Hazardous incident (near miss) in precautionary area
 - Relevance
 - Two vessels were navigating within the precautionary area, one vessel had already dropped her pilot and was heading northwards when an inbound vessel coming from the TSS passed close.
 - VTS Humber was recommended by MAIB to carefully monitor incidents in the vicinity of the pilot boarding ground and, if necessary, re-assess its position.
- 2006 – Collision in the Humber Estuary
 - Relevance
 - Two vessels collided in the river below the Humber bridge, in dense fog.
 - As a result, HES issued Memo to Pilots (**Annex 12**) which gave advice to pilots in the conduct of their passage. It includes sections on safe speed, bridge teamwork, fog signals and the availability of the VTS operator assistance in case of pilot disorientation.
 - HES also undertook to review its risk assessment process.

2.4 VDR INFORMATION

In the case of *Audacity*, VDR is not a requirement under the regulations, and none was fitted. An ECDIS had been newly installed during the recent dry-docking, but had not been commissioned before the vessel departed.

The available VDR data from *Leonis* was incomplete due to incorrect commissioning of the equipment data inputs. This had resulted in no information being recorded from the helm, engine data or bridge microphones.

The managers of *Leonis* had developed extensive emergency procedures and checklists but none of these documents gave any guidance on the operation, maintenance or requirement for retaining VDR information, or under which circumstances VDR data should be saved.

Under SOLAS Chapter V – Safety of Navigation Regulation 20, it will become mandatory on 1 July 2008 for vessels over 20,000gt and constructed before 1 July 2002 to be fitted with a VDR or (S) VDR (**Annex 13** refers). On 1 July 2010 this requirement will be further extended to vessels from 3,000gt up to 20,000gt.

As such, a vessel's VDR, where fitted, should be considered "critical equipment" and therefore procedures for maintenance and use should be specified in the company SMS manuals. These should include instructions on the procedures for saving of VDR data, and its inclusion as a key item in emergency checklists.

2.5 HUMBER ESTUARY SERVICES

2.5.1 Port Marine Safety Code (PMSC) Audit

The port of Hull and Humber Estuary Services were part of the ABP group. During the investigation it was noted that the external compliance auditing of the Humber SMS was conducted in November 2005 by ABP personnel from within the group.

The philosophy of ABP as a group was such that as long as each of the individual ports complied with the PMSC then the harbourmaster was broadly allowed to run the port as he wished. ABP as a group had a number of corporate policies, but there were no detailed marine policies that could be applied as a standard throughout the group. Standard procedures have the added benefit of assisting any auditor to verify basic compliance with the PMSC and assisting in the implementation and promulgation of best practices.

The personnel assigned to conduct the audit did not have any formal training in auditing procedures.

2.5.2 Risk assessment

During the compliance audit in 2005 remarks were made in the report concerning the conduct of risk assessments. The PMSC requires the harbour authority to conduct formal reviews of hazards and risks at least every 5 years. It was commented that a formal review would be needed in 2006. Also, formal risk assessment of river movements would need to be undertaken as a matter of urgency due to the planned opening of new berths.

Although the risk assessment was reviewed in 2006, the criteria for assessing the risk matrix were flawed: the frequency of collisions between vessels was assumed to be 1 event in 25 years, and the event categorised as in the river or its approaches “very unlikely” (**Annex 14**). From recent historical data one collision has occurred, on average, each year. Using the correct historical data reveals a greatly increased risk factor, indicating that either the existing safety barriers to prevent collisions occurring in the area are insufficient or are ineffective.

Risk assessment is a continuous process; risk should be reviewed if circumstances change or if there are indications that there exists greater risk than initially assumed. A collision is an indication that the risk assessment might not have identified all the factors, or that the safety barriers are insufficient. Good practice should be to review the risk analysis following any serious incident.

In the case of the similar incidents noted in section 2.3 there was no indication that the risk analysis had been reviewed.

2.6 HUMBER VTS OPERATIONS

2.6.1 Service provided by VTS Humber

Although MSN 1796 (M+F) indicates that Humber Estuary VTS operates service levels of TOS, NAS and INS, actually, HES has only ever offered service levels of TOS and INS, as is correctly stated in ALRS Vol 6 (1).

The area of VTS coverage is stated in ALRS Vol 6(1) to be:

The seaward limits bounded by straight lines joining the following positions:

- (1) 53 39.02N 0 06.90E
- (2) 53 40.00N 0 30.00E
- (3) 53 30.00N 0 30.00E
- (4) 53 28.40N 0 09.23E (**Figure 3**)

During the investigation into the methods used by VTS to operate a TOS it was apparent that the powers available to VTS operators to organise the traffic within harbour limits were clearly understood. However, the power of the VTS operator to give advice or guidance was not properly understood for traffic operating outside harbour limits, but within the VTS area, and there was marked reluctance by the operators to become involved in situations that might develop outside of the defined harbour limits.

2.6.2 Information broadcasts

General broadcasts containing weather reports, tidal information and navigational warnings were made by VTS Humber every 2 hours, at 3 minutes past the odd hours, 0103, 0303 etc. The broadcasts were made on VHF channels 12 and 14, with prior notification given on channel 16.

Current Humber estuary VTS procedures recognise that, in reduced visibility, more frequent visibility reports for Spurn, Immingham and Hull can be broadcast. There were no written procedures or requirements for the masters of vessels, or pilots, to report to the VTS operator whenever reduced visibility was encountered and any such reporting was left to their own judgment. While there were a small number of reports of reduced visibility received from vessels operating in the river and its approaches, in the period leading up to this accident, there was no systematic evaluation of these reports, so it was not realised by the VTS operators that there were significant patches of restricted visibility in the area. Therefore no additional broadcasts were made.

This lack of recognition of the visibility conditions in the river might have contributed to the VTS operator's apparent lack of concern about the developing close quarters situation between *Leonis* and *Audacity*. In assuming that the vessels could see each other visually, the operator was reluctant to contact either vessel to offer advice, on what was a rapidly developing dangerous maritime traffic situation.

A key factor in the circumstances which led to the collision between *Leonis* and *Audacity* was the paucity of information provided by the VTS to vessels manoeuvring in, or near the precautionary area (see 2.10).

The Humber estuary is a tidal area and there will inevitably be periods when there is a concentration of shipping within the precautionary area as draught restricted vessels manoeuvre to embark or disembark pilots. Where there is effectively a queue of vessels waiting to embark or disembark pilots, it is important that their masters are provided with sufficient information to ensure that these operations are conducted safely. For example, had VTS provided the master of *Leonis* with more information about the pilot boarding arrangements before the vessel had weighed her anchor, he would have been better prepared to adjust the progress of *Leonis* through the precautionary area to arrive at the pilot boarding station a safe distance astern of *Armia Ludowa* and in the correct order for boarding a pilot. Similarly, better information about the intentions of *Main Highway* should have been broadcast by VTS, and she should have been warned to keep clear of the vessels which were manoeuvring in conditions of restricted visibility, to take on board pilots.

In summary, it was incumbent on VTS to ensure that its pilot boarding plan recognised the need for vessels arriving at the boarding area to be properly separated geographically and in time. Details of the plan should also have been fully promulgated

to vessels navigating in the area, and proactive measures taken when, as in the case of *Leonis* transiting through the precautionary area ahead of *Armia Ludwa*, it became evident that the boarding plan was not being properly executed.

2.6.3 Preservation of records

Following the accident, Humber VTS was able to quickly provide MAIB with records of VHF transmissions and radar surveillance which were taken from its system hard drive memory. However, a failure of the VTS tape back-up system meant that a subsequent request for additional data could not be complied with as data stored on the system hard drive had already been overwritten by the time the request was made.

Although it was the custom and practice within Humber VTS to save recorded data following an accident, there were no formal procedures on how this information should be recorded and retained, detailed in the VTS operation manual.

2.7 LEONIS

2.7.1 Master / pilot exchange

Due to the limited amount of time, it is unlikely there was a full and effective master/pilot exchange before the pilot took the con and commenced manoeuvring.

It is probable that the setting of course and engines to start bringing *Leonis* up to the north west was initiated before the pilot was aware of the presence of the outbound *Audacity*. The traffic situation at this time is shown in **Figure 4**.

2.7.2 Bridge Team Management

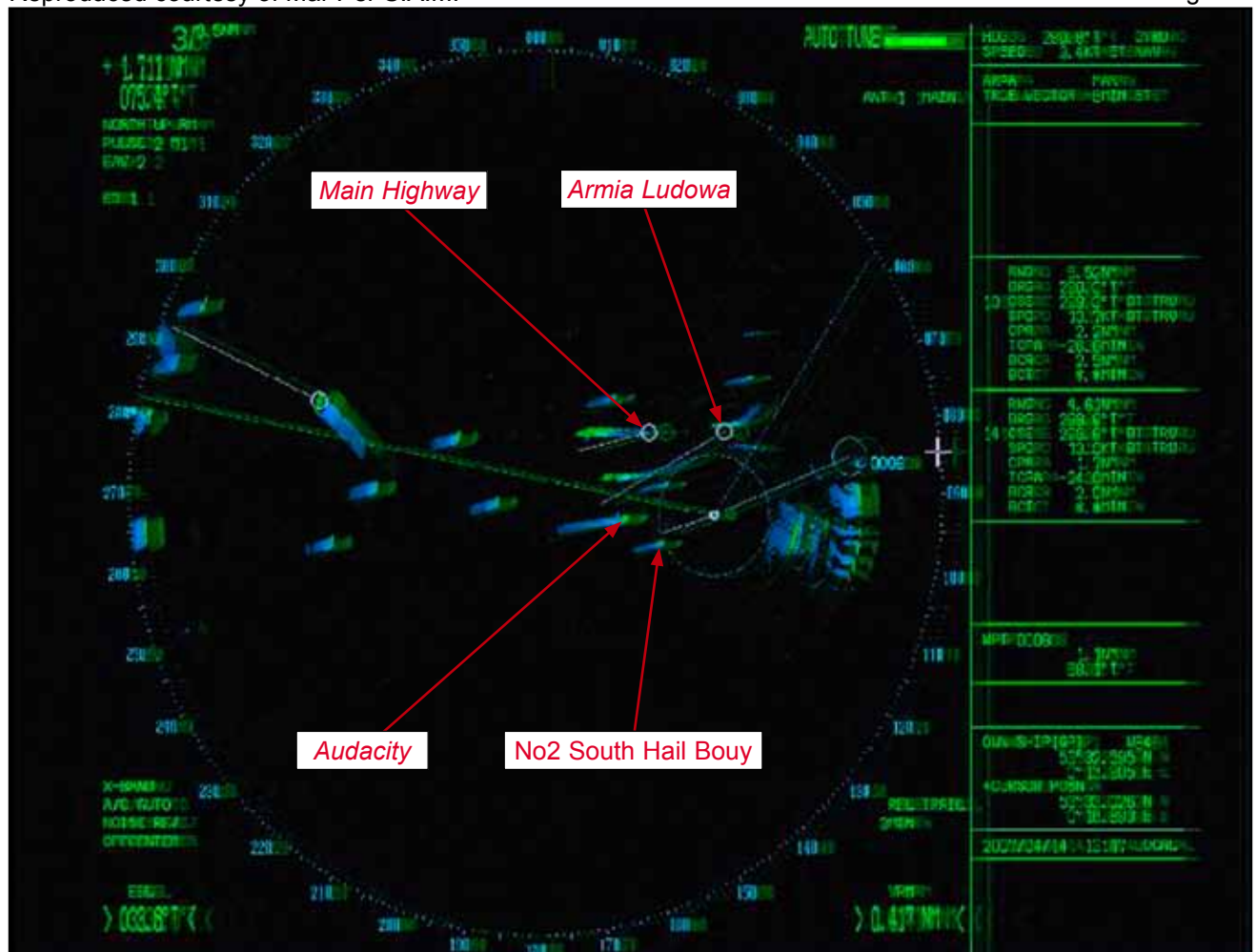
The bridge manning level was in compliance with company SMS procedures, and there was a dedicated lookout posted as required by the international collision regulations. The bridge team on *Leonis* was working efficiently prior to arriving at the pilot station. The master had heaved up the anchor in good time to ensure *Leonis* would be able to arrive at the pilot position at the time he had been instructed. He had also allowed an additional margin for the visibility and was proceeding at a reduced speed. Course and engines had been adjusted to compensate for the tidal stream, and *Leonis* arrived in the position and at the time requested by the VTS operator.

During the passage from the anchorage to the pilot station, the monitoring of the vessel's position was plotted regularly by the second officer.

After *Leonis* arrived at the pilot station, the VTS operator did not give any indication of when or where the pilot transfer would take place. *Leonis* was now navigating in reduced visibility in a precautionary area with five other vessels manoeuvring to take pilots. There were several intership VHF communications that were confusing, and an arranged passing with *Main Highway* created additional stress due to an earlier mistake in identifying the vessel involved.

2.7.3 Assessment of risk of collision

Due to the limited amount of time between the pilot becoming aware of the presence of *Audacity* and when he began to manoeuvre the vessel, it is unlikely that a proper assessment of the risk of collision was made.



Leonis' radar at 13:47 - time the pilot reaches the bridge

There was no effective ARPA plot made of *Audacity*: when the radar target was acquired there was no time for a reliable vector to be calculated before the collision occurred.

Under these conditions, *Leonis* commenced an alteration of course without the bridge team clearly establishing if it was safe to do so.

2.8 MAIN HIGHWAY

2.8.1 Actions of Main Highway

Main Highway was transiting the precautionary area during the planned pilot embarkation operation. The master held a current pilotage exemption certificate and therefore did not require a pilot.

Normal reporting procedures were being followed and, after reporting at "Outer Binks", the VTS operator advised him that all the vessels ahead were taking pilots from the same launch. The master replied that he would try to overtake them all to starboard and the VTS operator advised him to "proceed with caution".

The master chose to proceed through the precautionary area at speeds of between 16.8 kts and 8.2 kts, which could be considered high given the traffic density in the area and restricted visibility. This was because he was concerned about the need to arrive off Grimsby to make the tide. Analysis of the track of *Main Highway* through the

Precautionary Area (**Figure 5**) revealed the vessel made an alteration of course to port, to 190°, followed by a broad alteration of course to starboard, to 260°, shortly before the vessel passed 2 ½ cables to the north of *Leonis*. A further broad alteration of course to starboard, onto 330°, was then made. Substantial alterations of course of this nature will invariably affect the accuracy of the plots on ARPA radars, and it is unlikely that the master was able to gain an accurate assessment of the traffic situation as his vessel proceeded through the precautionary area. The progress of *Main Highway* should have caused concern to the duty VTS operator; however no attempt was made to question the vessel's actions.

2.9 AUDACITY

2.9.1 Master / pilot relationship

Neither the master nor the pilot demonstrated the level of authority that should be associated with the control of navigation of a vessel in restricted visibility; neither questioned the actions of the other and both assumed that the other was monitoring situational awareness which included a radar plot of other vessels in the area.

2.9.2 Bridge Team Management

Once *Audacity* had left her berth at the Immingham Oil Terminal, the pilot was content for the vessel to proceed downriver with support from ship's staff provided by the master alone. Notwithstanding that this manning arrangement conflicted with the requirements of the owner's SMS and Rule 5 of the Colregs, it also conflicted with the requirement of HES's "General Notice to Pilots 06/2003 (**Annex 15**)". This notice requires that the pilot should ensure that a helmsman is available at all times.

As a consequence, the bridge team consisted of insufficient personnel to undertake all the tasks required while navigating in a pilotage area in conditions of restricted visibility. The lack of a supporting navigation officer made it far more likely that individual errors would go undetected or unchallenged, and the lack of a helmsman diverted the master from his role as the situation developed.

The pilot and the master were not actively discussing the navigational or shipping situations, nor were they monitoring the actions of each other.

In the final moments before the collision, rather than addressing the imminent close quarters situation, the pilot became involved in a discussion with the coxswain of the pilot launch about his disembarkation. This effectively removed him from the con before the collision and prevented any effective assessment or action.

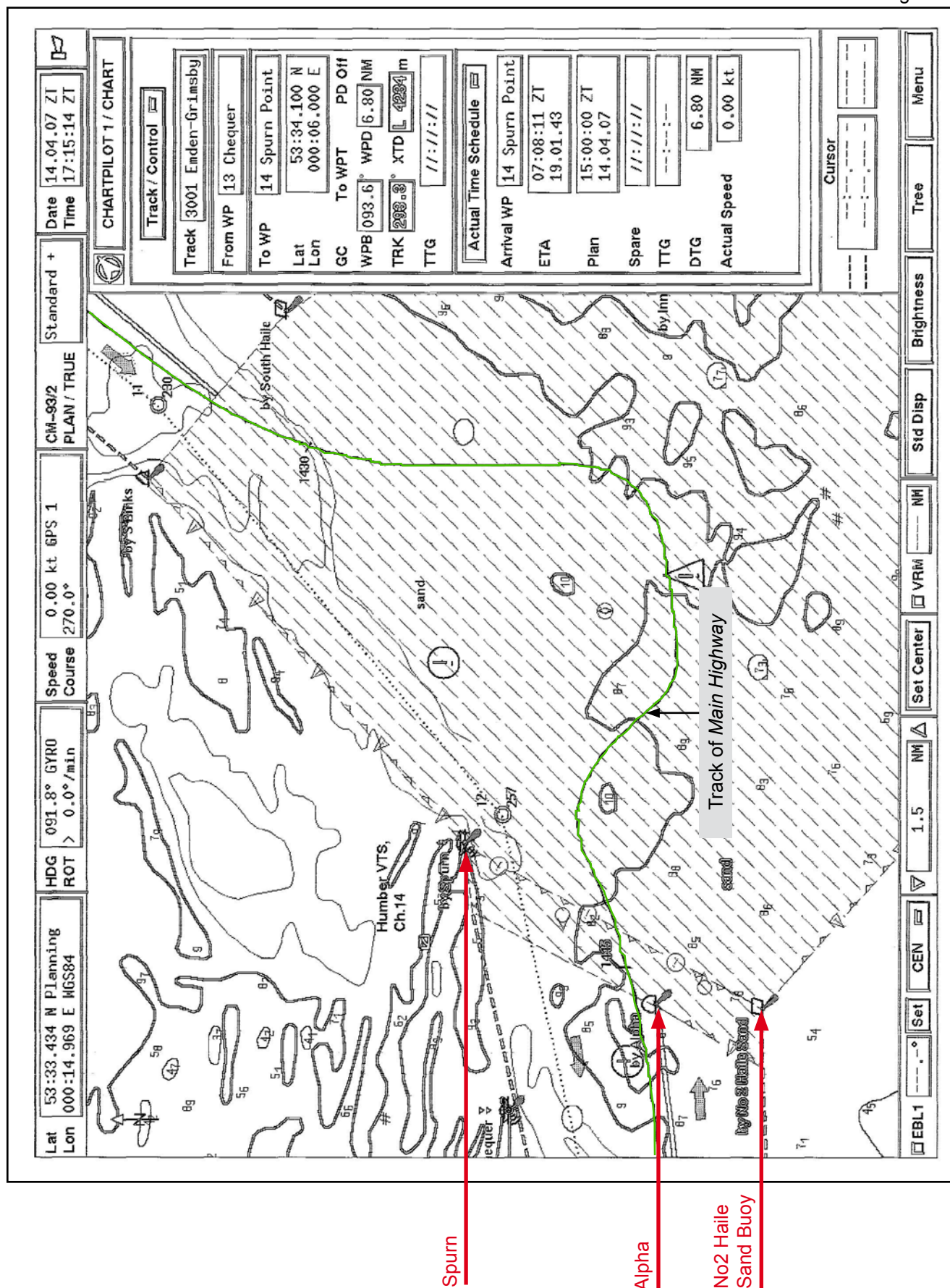
2.10 COMMUNICATIONS

2.10.1 VTS / *Leonis*

Interaction between the VTS operators and the master of *Leonis* was limited, and the communications did not use the IMO standard communication phrases and message identifiers promoted in VTS training courses (see 1.9.8).

It is unlikely that the request by VTS at 1320 for *Leonis* to reduce speed made a significant difference to the time the vessel would have arrived at the boarding area. The reason why the master was requested to reduce speed was not explained, and he was not informed of any delay to his pilot boarding time. This communication was also the first time the master was advised of the order of pilot boarding.

Figure 5



Track of Main Highway through the precautionary area

Guidance to the VTS operators in the Humber VTS operations manual states that they must avoid giving direct pilotage advice to the vessel, and IMO Resolution A.857(20) (**Annex 5**) part 2.3.4 further states the instructions should be result orientated only, leaving the details of execution to the master or pilot on board the vessel.

Since the communication did not advise the master of what result the VTS operator required, it made compliance by the master virtually impossible.

2.10.2 VTS / *Audacity*

Communication between the VTS and the pilot of *Audacity* was limited to routine reporting at designated reporting positions, an advisory message referring to the pilot's disembarking and additional information provided by *Audacity* on the visibility.

VTS operators considered that it was inappropriate to give advice to, or question, the actions of a vessel with a pilot embarked. The pilot was expected to have full situational awareness and to ensure that he was supported by an efficient bridge team.

From the IMO Resolution A.857(20) part 1.1.1 - VTS is a service implemented by a competent authority, designed to improve the safety and efficiency of vessel traffic. Para 2.3.4 states the instructions should be result orientated only, leaving the details of execution to the master or pilot on board the vessel.

It is therefore clear that the goal of VTS should be the effective control of all traffic in the area, and that guidance should be given based on the situation, regardless of whether or not there is a pilot on the bridge.

2.10.3 *Leonis* / *Audacity*

Audacity made two unsuccessful attempts to contact *Leonis* by VHF on channel 14. These calls went unheard by *Leonis* as they were still monitoring channel 13 for pilot boarding. When the pilot reached the bridge he reported into the VTS operator to advise he was proceeding up to the north towards the "Alpha" buoy. At this point *Audacity* was 5 cables away, but no comment on this course of action was made. After requesting the identity of the outbound vessel the pilot was advised that it was *Audacity*, and that she had been calling him; no mention was made about the close proximity of the two vessels or that the intended alteration towards the north would result in a close quarters situation.

During the conversation between the pilots, the developing situation was not fully discussed. The pilot of *Leonis* informed the pilot of *Audacity* what he was intending to do. *Audacity's* pilot, who, having had more opportunity to assess the situation and intending to pass to the north of *Leonis*, did not question these intentions and deferred to this course of action, offering to reduce speed and come to the south.

Despite not having complete situational awareness of the rapidly developing close quarters situation, the pilot of *Leonis* was now confident that *Audacity* would take action to avoid his vessel. He ordered the helmsman to steer 290° to start bringing the vessel towards the inbound TSS.

Collision was now imminent, but the pilot of *Audacity* became distracted by the coxswain of *P/L Venus* in discussing his disembarkation. No further action was taken until *Leonis* loomed out of the fog.

2.10.4 VTS / other vessels

Whilst the boarding operations of the first five vessels in the precautionary area were in progress, the pilot exempted vessel *Main Highway* was transiting the area. No comments were passed to *Main Highway* as she passed through the area where vessels had slowed and were manoeuvring to embark pilots.

From 1321 to 1343 there were several communications both between vessels in the area and between vessels and the VTS operator. On analysing a transcript of these communications several instances of confusion and misidentification become apparent. The plan for embarking the pilots in sequence was not effectively explained to the vessels involved. Information provided by VTS was in response to questions from the vessels rather than the VTS operator making a proactive effort to provide a clear explanation of the boarding plan.

Several inter ship communications took place on channel 13 and referred to actions taken within the precautionary area, some of which were requests for actions requiring dubious seamanship; the VTS operator took no part in offering clarification or guidance at this time.

2.10.5 Master / coxswain exchange

Prior to the embarkation of the pilot on *Leonis*, the coxswain passed instructions to the master in preparation for embarking the pilot. A colloquial standard set of phrases was used when in contact with a vessel, these were:

- 1) As he approached a vessel

Please reduce your speed to 6 kts and stand by on VHF channel 13 until the pilot is on board.

- 2) After embarking the pilot

Pilot on board, go back on course.

In this case, *Leonis*'s engine was stopped and the vessel was drifting, and the coxswain's instruction to reduce speed to 6 kts caused the master some confusion.

Just prior to boarding the pilot, the master of *Leonis* had intended to commence a round turn to port as he was concerned that he was getting too close to the exit from the outbound TSS. When he received instructions to go back on course, he was unsure what he was being asked to do and questioned the coxswain three times. Rather than clarifying the concise meaning of the instruction, it was repeated, verbatim, until the master accepted the situation. The master interpreted the coxswain's instruction to mean that he was to keep the course he was on prior to contact with *P/L Venus* and so turned to 282°, but did not reposition his vessel away from the outbound TSS lane.

The VTS operator was monitoring these communications, but no clarification or guidance was offered to the master of *Leonis*, nor was the use of non standard phrases by the pilot launch commented on.

2.11 PILOT / COXSWAIN BRIEFING

Before leaving the pilot vessel cabin and embarking onto *Leonis*, the pilot was given a briefing by the coxswain. The position of a buoy, presumed to be “Alpha” buoy, was pointed out on radar and the pilot believed he was boarding in a position approximately due east of this buoy.

At this time, the pilot launch was alongside and parallel to *Leonis* on her port side, on a heading of about 260°. The launch radar was set to a “head-up” display, and the target that was identified as the “Alpha” buoy was one point on the port bow at a range of about 9 cables.

It is unlikely that this target was the “Alpha” buoy. Based on the known position of the launch, there would have been a shadow sector of almost 180° caused by the side of *Leonis* which would have obscured the “Alpha” buoy from the launch’s radar. The target visible on the launch’s radar display was almost certainly the No 2 Haille Sand buoy. This gave the pilot an incorrect mental picture of the position of *Leonis* within the precautionary area.

When the coxswain was briefing the pilot, *Audacity* was 2 miles from *Leonis* and, as the launch’s radar was set to the 1-mile range scale, she could not have been visible on radar display.

It is important for pilots to gain proper orientation of the traffic and navigational situation prior to boarding any vessel.

SECTION 3 - CONCLUSIONS

The following safety issues have been highlighted by the investigation.

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT WHICH HAVE RESULTED IN RECOMMENDATIONS

1. The procedure for a pilot/coxswain briefing prior to embarking the vessel was not conducted efficiently. The radar equipment available in the launch was liable to severe shadow effect while close to vessels, making the identification of navigational markers unreliable. [2.11]

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

1. From historical data, incidents in the Humber Estuary are occurring more frequently than weighted in their current risk matrix. This indicates the risk is greater than initially allowed for or that the safety barriers are insufficient or ineffective. [2.3 / 2.5.2]
2. There were no detailed marine policies applied throughout the group, which made the auditing of ports within the ABP group for compliance with the PMSC more difficult. [2.5.1]
3. Risk analysis should be reviewed as a matter of routine after any serious incident to ensure the effectiveness of the safety barriers or to evaluate the need for additional barriers. [2.5.1]

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

1. Due to a combination of circumstances the VTS operator allowed *Leonis* to drift into a dangerous position close to the exit from the outbound TSS. This action was compounded by the lack of traffic information to either *Leonis* or *Audacity* about the position of the other. [2.10.1 / 2.10.4]
2. *Main Highway's* transit of the precautionary area, at speed, and with substantial alterations of course during the pilot boarding operation, was not good seamanship, nor was it commented on by VTS. [2.8.1]
3. The powers of the AHM to give advice and guidance to vessels operating inside the VTS area, but outside the port limits, were not fully understood, and there was reluctance for operators to issue proactive information to vessels within the precautionary area. [2.6.1 / 2.10.1]
4. It was incumbent on VTS to ensure that its plan for boarding of pilots recognised the need for vessels arriving at the boarding area to be properly separated both geographically and in time. [2.6.2]
5. The VDR recording from *Leonis* was incomplete, and information regarding helm and engine status was not recorded. There were no procedures in the SMS for the use and maintenance of VDR equipment. [2.4]

6. Routine information broadcasts, including visibility reports, were made every 2 hours. Although several reports of reduced visibility were received, no formal re-assessment was made of the visibility in the estuary and no additional broadcasts were made. There were no formal reduced visibility procedures and no requirements for reduced visibility to be reported. [2.6.2]
7. Humber VTS had no formal procedures for the preservation of records in the event of an incident. [2.6.3]
8. *Leonis* altered course towards the north west because both master and pilot were unaware of the presence of *Audacity*. As a result, no assessment of the risk of collision was made before manoeuvring. [2.7.1 / 2.7.4]
9. ARPA was not used effectively on either vessel to assess risk of collision. By the time the ARPA was used on *Leonis*, it was too late for it to provide reliable information. [2.7.4 / 2.9.5]
10. Effectively, no-one held the con on the bridge of *Audacity* because both the master and pilot had deferred to the other, there was no discussion or questioning of the intentions of *Leonis*, and at a critical time they involved themselves with tasks that were inappropriate given the impending close quarters situation. [2.9.1 / 2.9.2]
11. The bridge on *Audacity* was insufficiently manned in the circumstances and conditions. It did not comply with company requirements or HES instructions to pilots, however no additional resources were requested by the pilot. [2.9.2]
12. Despite advising the pilot of *Leonis* that he would take action and come to the south, the pilot of *Audacity* did not alter course. This lack of action was not questioned by the master or the VTS operator, and the pilot of *Audacity* did not advise *Leonis's* pilot that he no longer intended to act as agreed. [2.9.2 / 2.10.3]
13. The communication between all parties involved was unclear and prone to misunderstanding, and use of standard marine phrases was not practised. [2.10]
14. VTS operators did not consider they were able to give advice and guidance to vessels with pilots on board. It was considered that the pilot would know what he was doing and that the operator did not need to be further involved once a pilot was on board. [2.10.2]
15. Communications from the VTS operator and *P/L Venus* were ambiguous and confusing. They were not result orientated and did not use identifier markers. Requests for specific information were inappropriately answered. [2.10.5 / 2.11]

SECTION 4 - ACTION TAKEN (OR TO BE TAKEN)

4.1 BY THE MANAGEMENT OF *LEONIS*

- The company's vessels have been provided with mobile telephones for ships, business and emergency communications.
- It is intended to fit all company vessels with Sat "M" equipment to further improve communications.
- A review of the Safety Management System emergency procedures has been conducted to ensure all parties that require notification after an incident are listed, and contact numbers available.
- A duty rota for "weekend duty superintendents" and for a backup point of contact has been implemented.
- *Leonis* has been attended by technicians to evaluate the VDR installation.

4.2 BY THE MANAGEMENT OF *AUDACITY*

- A review of the procedures in place to monitor onboard compliance with company policy and procedures has been completed.
- Fleet Instruction letters have been issued. These draw deck officers' attention to the failures identified in the Bridge Team Management System. These letters have been backed up by Superintendents conducting "ride-on" auditing of bridge teams.
- A procedure to assess all senior officers at least twice within a 3-year period exists within James Fisher & Sons. The records of former Everard Group employees will be reviewed to ensure there are no senior officers within this cadre that have not been the subject of a recent assessment.

4.3 BY HUMBER ESTUARY SERVICES

- The harbourmaster has issued a "Notice to PECs" advising of the need to proceed at all times at a safe speed, but especially within the precautionary area.
- The harbourmaster has issued a "Notice To Coxswains" clarifying the acceptable communications to be used when interacting with vessels (**Annex 16**).
- The harbourmaster has issued a "Staff Notice" to AHMs and VTSOs reinforcing the need for the VTS operators to be more pro-active (**Annex 17**).
- Procedures to routinely monitor and assess the actions of pilots and bridge teams will be introduced. VTS recordings will be used to assist in this process.
- The Humber VTS Operations Manual is to undergo a revision that will bring it into line with IALA Guideline V-127 (**Annex 18**). This will introduce detailed fog definitions and operational guidance.
- In December 2007, ABP Humber completed a full review of its risk assessments covering the operation in the Humber VTS area. The MCA has been invited to conduct a verification visit to validate its compliance with the PMSC.
- In January 2008 HES circulated Proposed Amendments to Pilot Boarding Stations (**Annex 19**) for consultation with relevant stakeholders.

SECTION 5 - RECOMMENDATIONS

UK Major Ports Group and **British Ports Association** are recommended to:

2008/103 Inform their members of the MAIB's advice that they should consider how best to review how pilots can be helped to gain proper orientation of the traffic and navigational situation prior to boarding vessels to conduct acts of pilotage.

Associated British Ports Group is recommended to:

2008/104 Develop Group Marine Policies covering headline issues which can be implemented throughout the ports within the Group. Such policies should encompass, but not be limited to, training, risk assessment, and development and promulgation of best practice.

2008/105 Develop an auditing process to verify compliance with the group marine policies, including procedures which track the status of audit findings until agreed corrective actions have been implemented.

Marine Accident Investigation Branch
January 2008

Safety recommendations shall in no case create a presumption of blame or liability