ACCIDENT REPORT

Report on the investigation of the collision between

Alexander Tvardovskiy

and

UKD Bluefin and *Wilson Hawk*

in Immingham

1 August 2012

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

SERIOUS MARINE CASUALTY

REPORT NO 10/2013

MAY 2013

Extract from

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2012 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 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

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Alexander Tvardovskiy cover image courtesy of Ria Maat and *Wilson Hawk* cover image courtesy of Vesseltracker.com.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

ATSB	-	Australian Transport Safety Bureau
BV	-	Bureau Veritas
CCTV	-	Closed-circuit television
CPP	-	Controllable Pitch Propeller
DOC	-	Document of Compliance
DP	-	Designated Person
GL	-	Germanischer Lloyd
gt	-	gross tonnage
IACS	-	International Association of Classification Societies
ICS	-	International Chamber of Shipping
IMO	-	International Maritime Organization
ISM	-	International Safety Management Code
ISPS Code	-	International Ship and Port Facility Security Code
kW	-	kilowatt
LR	-	Lloyd's Register
m	-	metre
MCA	-	Maritime and Coastguard Agency
MSC	-	Maritime Safety Committee
MSN	-	Merchant Shipping Notice
NWSC	-	JS North-Western Shipping Company
PSC	-	Port State Control
rpm	-	revolutions per minute
RS	-	Russian Maritime Register of Shipping
s	-	second
SMC	-	Safety Management Certificate
SMS	-	Safety Management System

SOLAS	-	International Convention for the Safety of Life at Sea
STCW	-	International Convention on Standards of Training, Certification And Watchkeeping for Seafarers 1978, as amended (STCW Convention)
UKD	-	UK Dredging
UKMPG	-	UK Major Ports Group Limited
UMS	-	Unattended machinery space
UTC	-	Universal co-ordinated time
VHF	-	Very High Frequency

Times: All times in this report are UTC(+1) unless otherwise stated

SYNOPSIS

On 1 August 2012, the Russian registered multi-purpose cargo vessel *Alexander Tvardovskiy* collided with the stationary dredger *UKD Bluefin* while manoeuvring to leave Immingham, UK. The impact pushed *UKD Bluefin* against the general cargo vessel *Wilson Hawk,* which was discharging her cargo alongside. All three vessels were damaged but there were no injuries and no pollution.

Alexander Tvardovskiy's propulsion system was being operated in manual control during the departure, with crew in the engine room responding to orders passed by the telegraph. Having left the berth stern first, several orders were passed by telegraph for the vessel's propulsion to be operated ahead but, due to an error by the engineer operating the gearbox solenoid valves, the engine revolutions were increased while the gearbox was still set to drive astern. Control of the vessel was lost as she gathered increasing sternway and attempts by the bridge team to recover the situation were ineffectual. Contributory factors included:

- The automatic machinery control system had been defective for about 2 months, but this had not been reported to the ship's manager or classification society.

- The arrangement for manual control of the vessel's propulsion was suitable only for use in an emergency, there being insufficient provision of controls and instrumentation for effective control of the vessel during routine pilotage and berthing.

- Neither the bridge team nor the engineers in the engine room monitored the direction of rotation of the propeller shaft.

- Because the vessel had been built before 1998, she was exempted from a SOLAS regulation that required the fitting of propeller directional and speed indicators in the engine room.

- The pilot was not informed that the vessel's engines were being operated in manual control.

A recommendation has been made to Germanischer Lloyd aimed at ensuring that vessels have a propeller shaft indicator fitted in the engine room, regardless of their age. Recommendations to the UK Major Ports Group Limited and the International Chamber of Shipping are intended to improve the exchange of information between masters and pilots. A recommendation has also been made to the ship's manager, JS North-Western Shipping Company, aimed at improving the safety management on board its vessels.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *ALEXANDER TVARDOVSKIY, UKD BLUEFIN, WILSON HAWK* AND ACCIDENT

SHIP PARTICULARS			
Vessel's name	*Alexander Tvardovskiy*	*UKD Bluefin*	*Wilson Hawk*
Flag	Russia	UK	Barbados
Classification society	Germanischer Lloyd	Bureau Veritas	Germanischer Lloyd
IMO number	9057290	9143427	9064906
Type	Multi-purpose dry cargo	Trailing suction hopper dredger	General cargo
Registered owners	NWS 6 Balt Shipping Company Limited	Associated British Ports	Wilson Allmennaksjeselskap
Managers	JS North-Western Shipping Company	UK Dredging	Wilson Eurocarriers Allmennaksjeselskap
Construction	Steel	Steel	Steel
Build	1996, Volgograd, Russia	1997	1994
Length overall	89.5 m	97.96 m	91.2 m
Gross tonnage	2319	4171	2811
Minimum safe manning	9	Not known	Not known
Authorised cargo	General cargo and containers	Dredged seabed sediment	General cargo
VOYAGE PARTICULARS			
Port of departure	Immingham	Immingham	Glomfjord, Norway
Port of arrival	Sunderland	Immingham	Immingham
Type of voyage	Coastal	Within port limits	Short international
Cargo information	None	Seabed sediment	Bulk fertilizer

Manning	11	Not known	Not known
MARINE CASUALTY INFORMATION			
Date and time	1 August 2012 at 1337		
Type of marine casualty or incident	Serious Marine Casualty		
Location of incident	Immingham		
Place on board	Starboard quarter	Port and starboard sides	Starboard side
Injuries/fatalities	None	None	None
Damage/ environmental impact	Shell penetrations at starboard quarter	Shell plate penetration, damage to dredge pipe gantry and guides	Multiple shell plate damage, minor damage to rescue boat
Ship operation	Under pilotage, manoeuvring	Port dredging	Cargo discharge
Voyage segment	Departure	Not applicable	Alongside
External & internal environment	Good visibility Sheltered waters Wind: 18kts from the south		
Persons on board	11	Not known	Not known

Image courtesy of Ria Maat, Marine Traffic.com

Alexander Tvardovskiy

UKD Bluefin

Image courtesy of vesseltracker.com

Wilson Hawk

1.2 NARRATIVE

On 1 August 2012, the multi-purpose dry cargo vessel *Alexander Tvardovskiy* was scheduled to sail from berth 2 in Immingham, UK **(Figures 1** and **2)** for passage to Sunderland, UK. The vessel was in ballast.

At 1310, the vessel's main engine was started. The propulsion system was then tested by engaging the gearbox ahead and astern by using local controls inside the engine room. The chief engineer, second engineer, and the vessel's electrician then stood by in the engine room ready to manually operate the engine and gearbox during the vessel's departure.

At 1320, the pilot arrived on board and was met by the chief officer on the bridge. The chief officer confirmed to the pilot that the vessel was ready for departure and that there were no significant defects. He did not provide the pilot with a copy of the pilot card. At the time, the dredger *UKD Bluefin* was secured alongside berth 1 and the general cargo vessel *Wilson Hawk* was discharging her cargo at berth 4 **(Figures 1** and **2)**.

At about 1330, *UKD Bluefin* left her berth and manoeuvred across the dock "square". Her port and starboard dredge pipes were lowered to begin dredging parallel to, and close by, *Wilson Hawk*.

At about the same time, the master, who had recently joined the vessel, arrived on the bridge of the *Alexander Tvardovskiy*. The master told the pilot that he wanted to see how the vessel handled and, consequently, he did not intend to make fast the tug *Guardsman,* which was waiting to assist off the vessel's port side. The weather was fine and clear, and the wind was 18 knots from the south.

At 1333, *Alexander Tvardovskiy'*s mooring ropes were let go. The vessel's stern was blown gently off the berth by the wind, and the master used the bow thruster to keep the vessel parallel to the quay. The chief officer was at the helm, which was kept at 'midships'.

When *Alexander Tvardovskiy* was about 40m off the berth **(Figure 3)**, the master moved the bridge telegraph lever **(Figure 4)** to the 'dead slow astern' position, and the vessel started to move astern. The propeller shaft tachometer on the bridge control panel was not monitored.

At about 1335, the master moved the telegraph lever to the 'stop' position. However, the vessel did not slow as the master had expected, so he set the lever to 'slow ahead'. This action had no effect and *Alexander Tvardovskiy* continued to move astern at a speed of about 1 knot. As the vessel closed to within 50m of *UKD Bluefin*, which was stopped in the water parallel to and near *Wilson Hawk*, the pilot told the master that *Alexander Tvardovskiy* needed to be stopped. In response, the master moved the telegraph lever to 'full ahead'. The order of 'full ahead' was also passed verbally by the chief officer to the engine room over a fixed intercom system. The engine speed soon increased and a large cloud of black smoke emitted from *Alexander Tvardovskiy*'s funnel **(Figure 5)**; the vessel's speed astern increased to about 2 knots.

Image courtesy of Immingham Port Authority

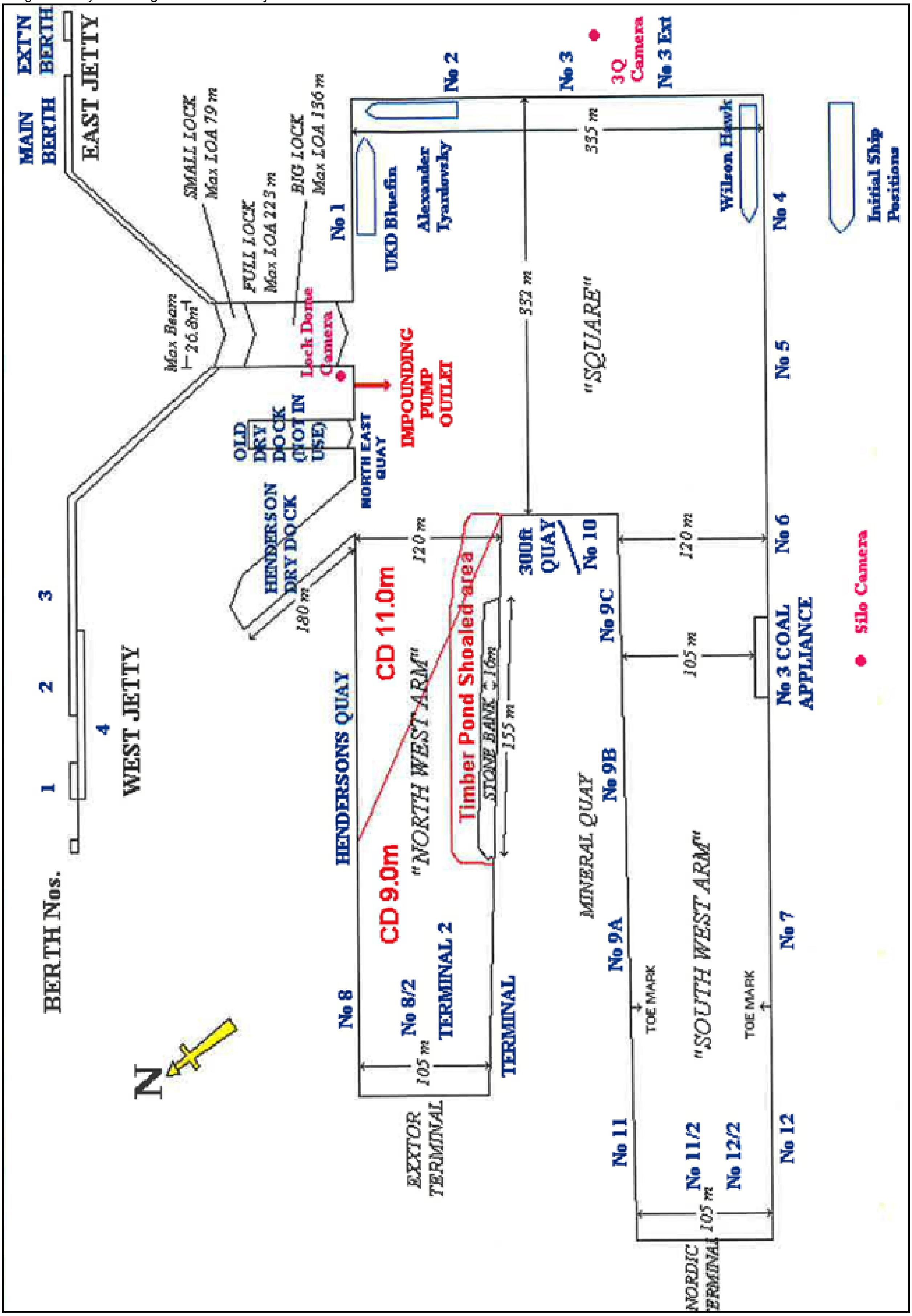

Figure 1: Immingham port layout

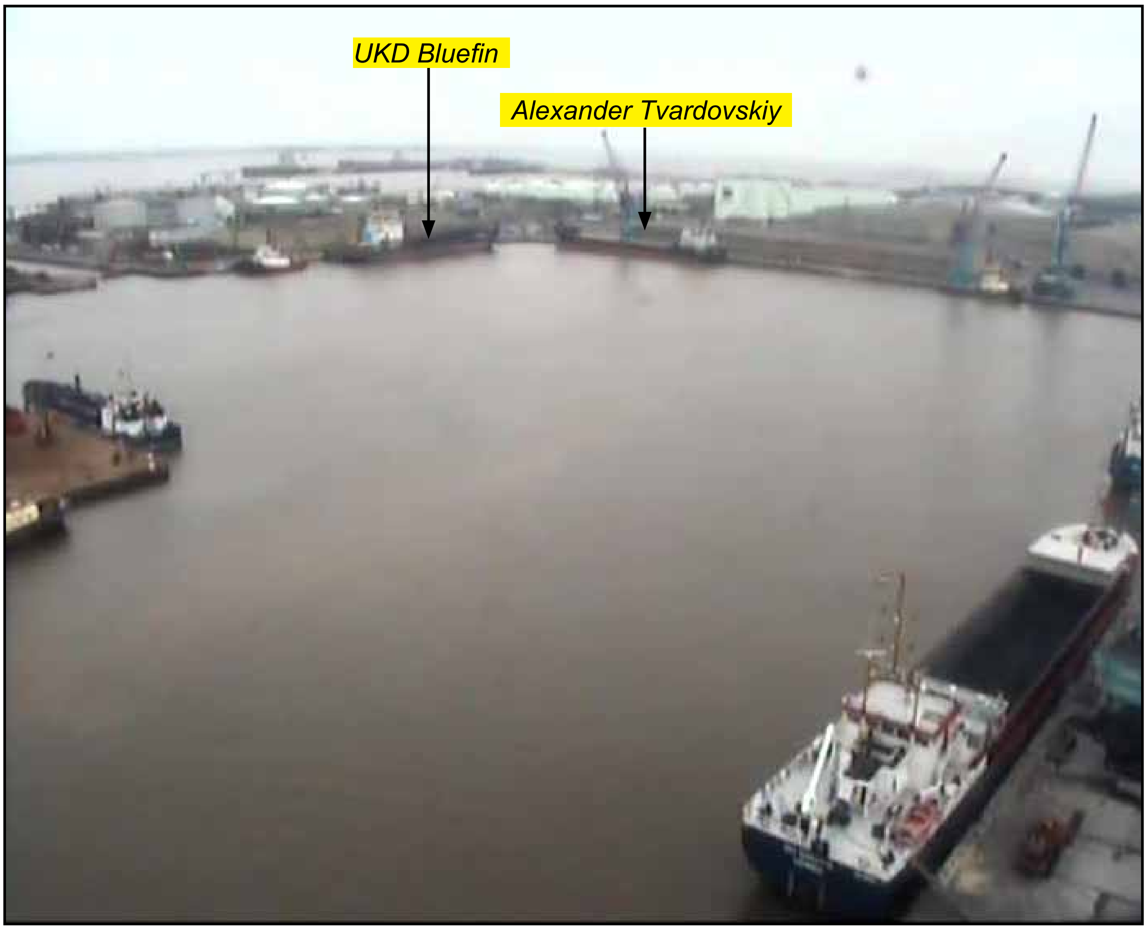

Figure 2: Port CCTV: *Alexander Tvardovskiy* alongside berth 2 in Immingham

Figure 3: Port CCTV 1334 hrs: *Alexander Tvardovskiy* leaving her berth

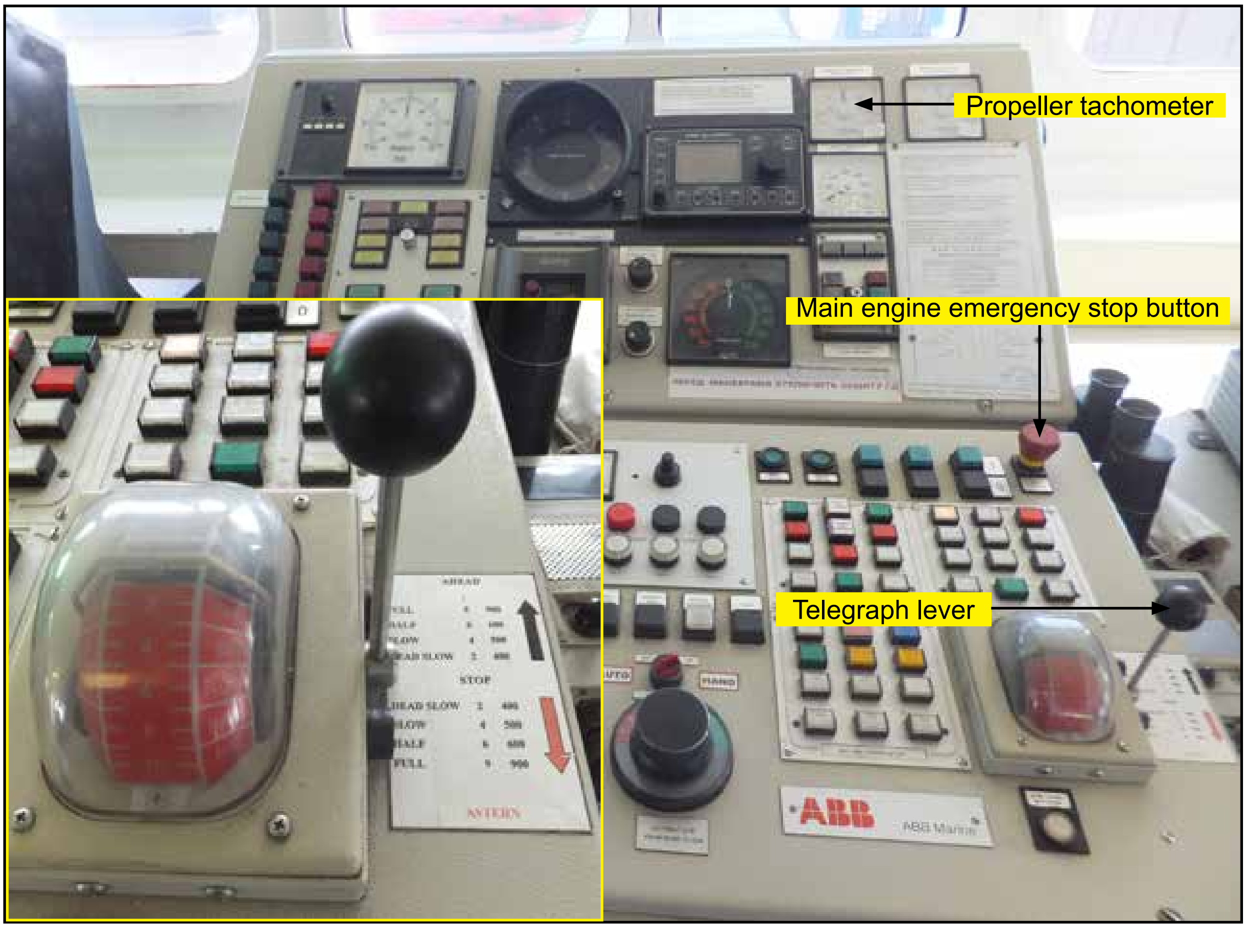

Figure 4: Bridge propulsion control panel


Figure 5: Port CCTV 1336 hrs: *Alexander Tvardovskiy* funnel smoke

Meanwhile, *UKD Bluefin*'s master contacted *Alexander Tvardovskiy* on Very High Frequency (VHF) radio channel 68 and asked whether *Alexander Tvardovskiy* was going ahead. The pilot replied that the engine telegraph was on 'full ahead'. Nevertheless, *UKD Bluefin*'s master remained concerned and ordered the starboard dredge pipe to be recovered.

Twenty seconds later, at about 1337, *Alexander Tvardovskiy*'s starboard quarter struck *UKD Bluefin*'s starboard side, amidships **(Figure 6)**. The pilot ordered the main engine to be stopped, so the master put the bridge telegraph lever to 'stop' and the chief officer again repeated the order over the intercom.

Figure 6: Port CCTV 1337 hrs: *Alexander Tvardovskiy* collision with *UKD Bluefin*

About 1 minute after the collision, *Alexander Tvardovskiy*'s engine was taken out of gear. By that time she had pushed *UKD Bluefin* against *Wilson Hawk* **(Figure 7)**. *Alexander Tvardovskiy* was then manoeuvred ahead and the vessel placed back alongside berth 2 without further incident.

1.3 DAMAGE

Alexander Tvardovskiy sustained significant deformation to her starboard quarter, a penetration to the aft peak tank, and buckling of her poop deck **(Figures 8** and **9)**.

UKD Bluefin suffered a 2m penetration of her starboard void space and internal frame damage **(Figures 10** and **11)**. The vessel's fixed dredging equipment was also damaged. Repairs to the vessel took 16 days in dry dock to complete, and cost about £180,000.

Figure 7: Port CCTV: *Alexander Tvardovskiy* collision with *UKD Bluefin* and *Wilson Hawk*

Figure 8: *Alexander Tvardovskiy* damage to starboard quarter

Figure 9: *Alexander Tvardovskiy* damage to poop deck

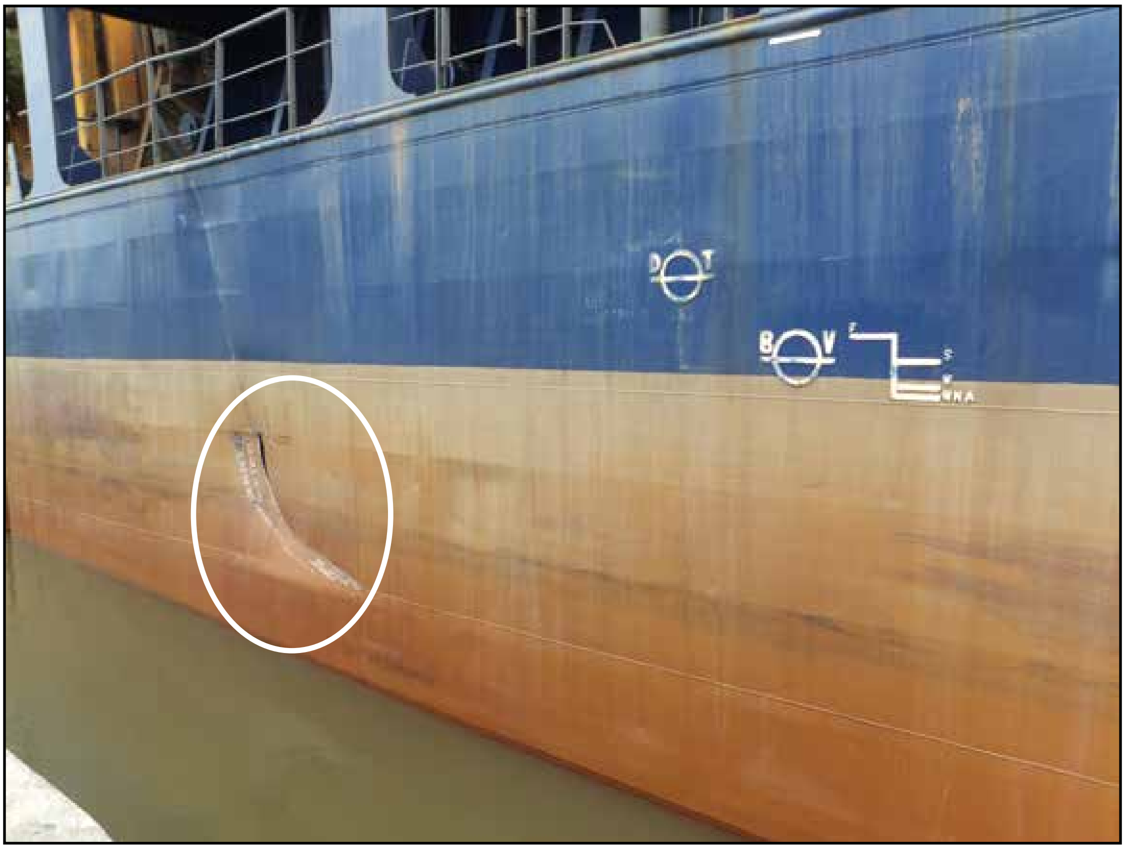

Figure 10: *UKD Bluefin* damage to starboard shell plate

Figure 11: *UKD Bluefin* damage to internal frames

Wilson Hawk's side plating was damaged in several areas **(Figures 12** and **13)**, and the rescue boat also suffered damage.

Figure 12: *Wilson Hawk* damage to deck starboard side

Figure 13: *Wilson Hawk* damage to shell plate starboard side

1.4 POST-ACCIDENT ACTIONS

On 2 August 2012, a Germanischer Lloyd (GL) surveyor tested *Alexander Tvardovskiy'*s bridge control system. During the tests, the time taken to engage and then to disengage the gearbox clutch was significantly slower than expected. Consequently, the vessel's mooring ropes came under considerable tension and the main engine's 'emergency stop' button sited on the bridge propulsion control panel **(Figure 4)** was operated. The 'emergency stop' button did not work, so the engine was stopped by operating the fuel rack lever on the main engine.

Following the test, the GL surveyor would not authorise the vessel to sail until either the bridge control system was repaired or the vessel was able to be effectively manoeuvred in manual control. The GL surveyor also required the main engine 'emergency stop' control to be repaired and temporary repairs of the hull damage be completed.

On 10 August 2012, the GL surveyor re-surveyed *Alexander Tvardovskiy*. The system for bridge control of propulsion had not been repaired, but the propulsion system was operated in manual control to the surveyor's satisfaction. *Alexander Tvardovskiy* sailed the same day for Kaliningrad, Russia, where the damage to her hull was to be repaired. During the vessel's departure from Immingham, a tug was secured and a pilot was embarked. The pilot was informed that the machinery was working correctly; he was not told that the propulsion system was being operated in manual control.

On 13 August 2012, GL notified the Russian Ministry of Transport, Shipping Safety Division for Maritime and River Transport of the deficiencies found during the surveyor's inspection. The information provided included:

- *The condition of the ship or its equipment does not correspond substantially with the particulars of the certificate(s)*

- *Company failed to notify Class (GL) of substantial operating defect (Bridge control defective).*

GL also reported to the Russian Maritime Register of Shipping (RS) [1] several deficiencies identified on board *Alexander Tvardovskiy* in Immingham that related to failures in the vessel's Safety Management System (SMS).

On 30 August 2012, a representative from the Research and Production Association "Dontechcenter" Limited (Dontechcenter), attended *Alexander Tvardovskiy* in Kaliningrad. The representative adjusted the main engine idle speed from 550rpm to 300rpm. He also adjusted the telegraph limit switches and rectified several software errors. Following the adjustments, trials confirmed that the propulsion control system was operating in accordance with the parameters detailed in the operating instructions provided by ABB, its manufacturer.

1.5 THE CREW

Alexander Tvardovskiy's 11 crew were all Russian nationals, and comprised the master, chief officer, second officer, chief engineer, second engineer, electrician, three deck ratings, a cook and a deck cadet. All of the crew were employed by JS North-West Shipping Company (NWSC), and all except the second engineer had joined the vessel in Immingham on 29 July 2012.

The master first went to sea in 1986 and had served as master on board a variety of vessels of less than 3000gt. Prior to joining *Alexander Tvardovskiy*, he had worked over a 7-year period on board a 119m dry cargo vessel fitted with twin propellers, which was also operated by NWSC. This was the first occasion the master had served on board *Alexander Tvardovskiy*.

The chief officer completed his training at a nautical institute in 1996. He had sailed as a chief officer on a mixture of Russian river and sea-going vessels for 5 years and had qualified as a master (STCW II/2)[2] in 2009.

The chief engineer had risen through the ranks, from motorman to chief engineer, over a period of 35 years at sea with NWSC. During this time, he had sailed on similar types of vessel to *Alexander Tvardovskiy*.

The second engineer first went to sea as a motorman in 1985 and he had qualified as a second engineer in January 2002. The second engineer had worked for NWSC between 1990 and 2004, and again from 2010 onwards. He had joined *Alexander Tvardovskiy* for the first time 7 weeks before the accident.

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[1] Both GL and RS are members of the International Association of Classification Societies (IACS). IACS consists of thirteen of the largest classification societies in the world, which cover more than 90% of the world's cargo-carrying vessels.

The report was sent in accordance with the IACS Procedural Requirement No.17 (PR-17). The purpose of this Procedural Requirement is to ensure that an IACS society responsible for the issue of a Safety Management Certificate (SMC) is notified when deficiencies relating to possible safety management system failures are identified by another IACS society.

[2] STCW – Standards of Training and Certification of Watch Keepers

The electrician had worked as a shipboard electrician since 1980, mainly on board NWSC's river-going vessels.

1.6 THE PROPULSION SYSTEM

1.6.1 The main engine

Alexander Tvardovskiy was powered by an 8 cylinder medium speed 4-stroke diesel engine, type VDS 29/24 AL, manufactured by SKL Motor GmbH **(Figure 14)**, which had an output of 1890kW at a nominal speed of 900rpm and a rated (operational maximum) speed of 1000rpm. The engine's speed was regulated by a Heinzmann electronic governor. The engine's idle and minimum speed was 300rpm and the clutch engagement speed when coupling to the gearbox was 450rpm.

Figure 14: Main engine and gearbox as seen from the telegraph position

The engine could be stopped either electrically through a remote ‘emergency stop’ button on the bridge **(Figure 4)**, or manually by the operation of a fuel rack lever on the engine. The engine’s operating parameters were monitored on a control panel sited at its front **(Figure 15)**.

Figure 15: Main engine control panel

1.6.2 The gearbox

The gearbox **(Figure 16)** was a Reintjes type WAF 1961 reverse reduction gearbox designed for use with a fixed pitch propeller. The gearbox was close-coupled to the main engine and incorporated hydraulically-operated disc clutches. The clutch was engaged and disengaged, and the direction of the gearbox (ahead or astern) was controlled via solenoid valves mounted on a control valve block on top of the gearbox.

A propeller tachometer was sited on the central console on the bridge that indicated the speed and direction of rotation of the propeller shaft **(Figures 4** and **17)**.

1.6.3 Control options

The main engine speed governor and the gearbox solenoids could be controlled either automatically from the bridge or manually in the engine room. A two-position switch to enable the changeover between automatic and manual propulsion control was situated adjacent to the engine room telegraph **(Figure 18)**.

The automatic propulsion control system was operated using the bridge telegraph, which relied on a computer to ensure the timing and sequencing of engine and gearbox movements remained within set parameters. When the system was switched to manual control, orders were signalled to the engine room using the same telegraph lever on the bridge, but in this mode the direct control of engine

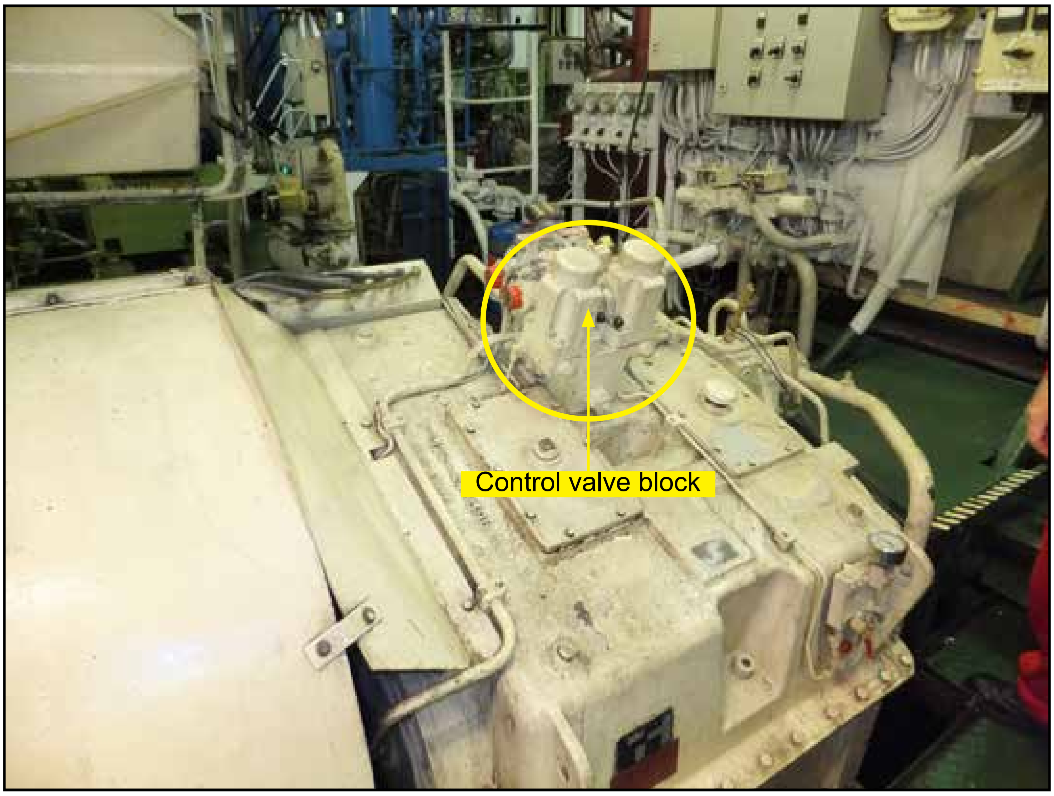

Figure 16: Main engine gearbox

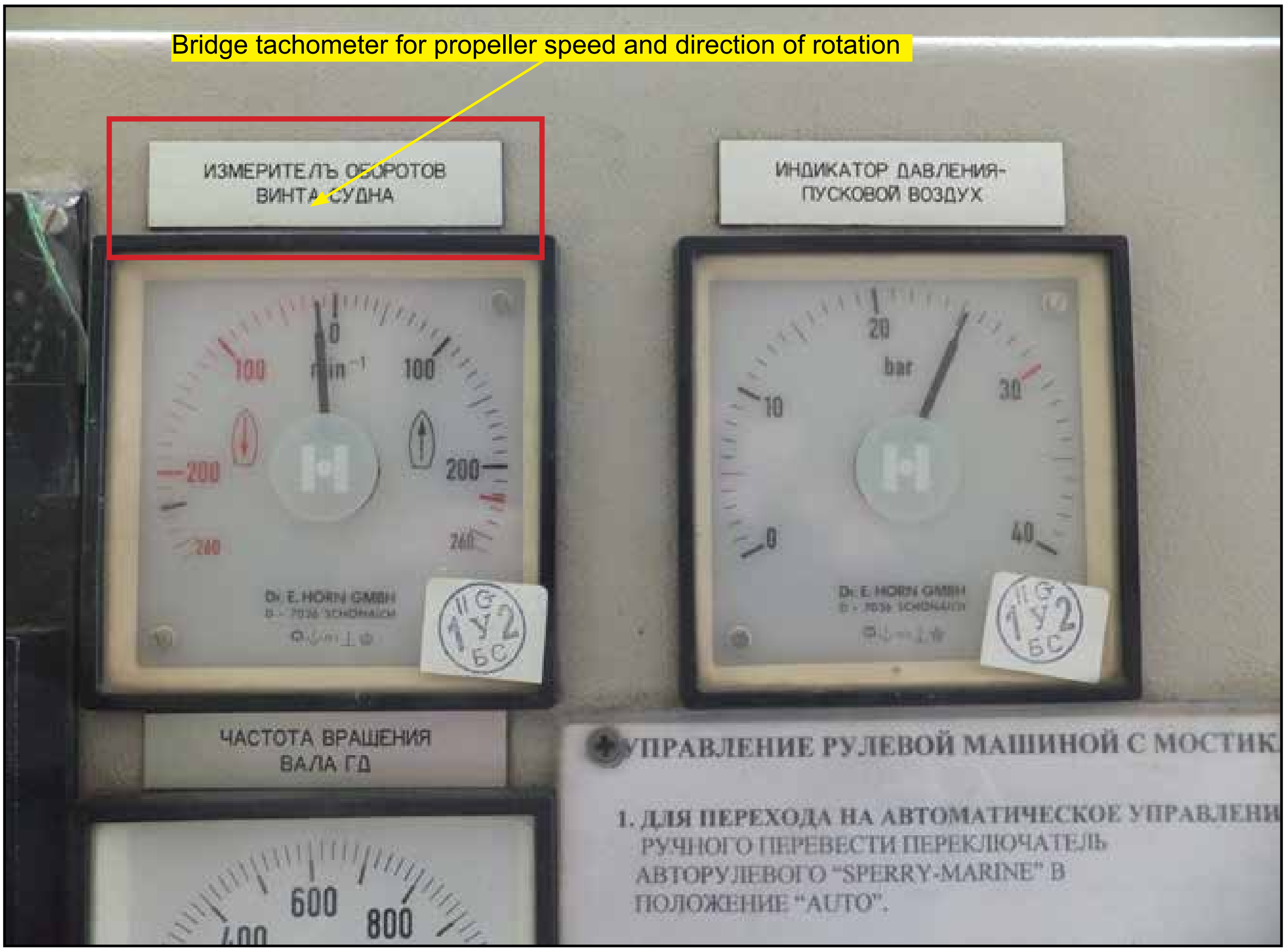

Figure 17: Bridge tachometer for propeller speed and direction of rotation

Figure 18: Changeover switch: automatic or manual control

and gearbox were disabled and the demanded propulsion setting was displayed on a repeater in the port forward corner of the engine room. Engine room personnel then made the necessary changes. The speed governor was adjusted using a wheel at its base **(Figure 19)** while the gearbox solenoids were activated using dedicated metal pins to push the actuating shafts **(Figure 20)**.

1.7 AUTOMATIC CONTROL

1.7.1 Description

The automatic propulsion control system enabled the bridge telegraph to automatically operate the main engine and gearbox controls in the engine room. As a result, an unmanned machinery space (UMS) system was operated on board the vessel.

An H.M. Stein & Sohn GmbH engine order telegraph was mounted on the central bridge console. This included a step-less control lever for vessel speed (ahead or astern). The electrically-operated system was fitted with two separate transmission channels to the telegraph receiver unit in the engine room, providing both the order and the feedback signals.

The telegraph was linked to a programmable electronic remote control system, ABB type RC94-RRG **(Figure 21)**, designed for use with reversing reduction gear systems and fixed pitch propellers. The remote control system was type approved by Lloyd's Register (LR), GL and Bureau Veritas (BV), and included:

- main engine start/stop
- engine speed control
- clutch and direction control
- automatic engine speed increase during clutch engagement
- Indication of system failure and clutch engagement.

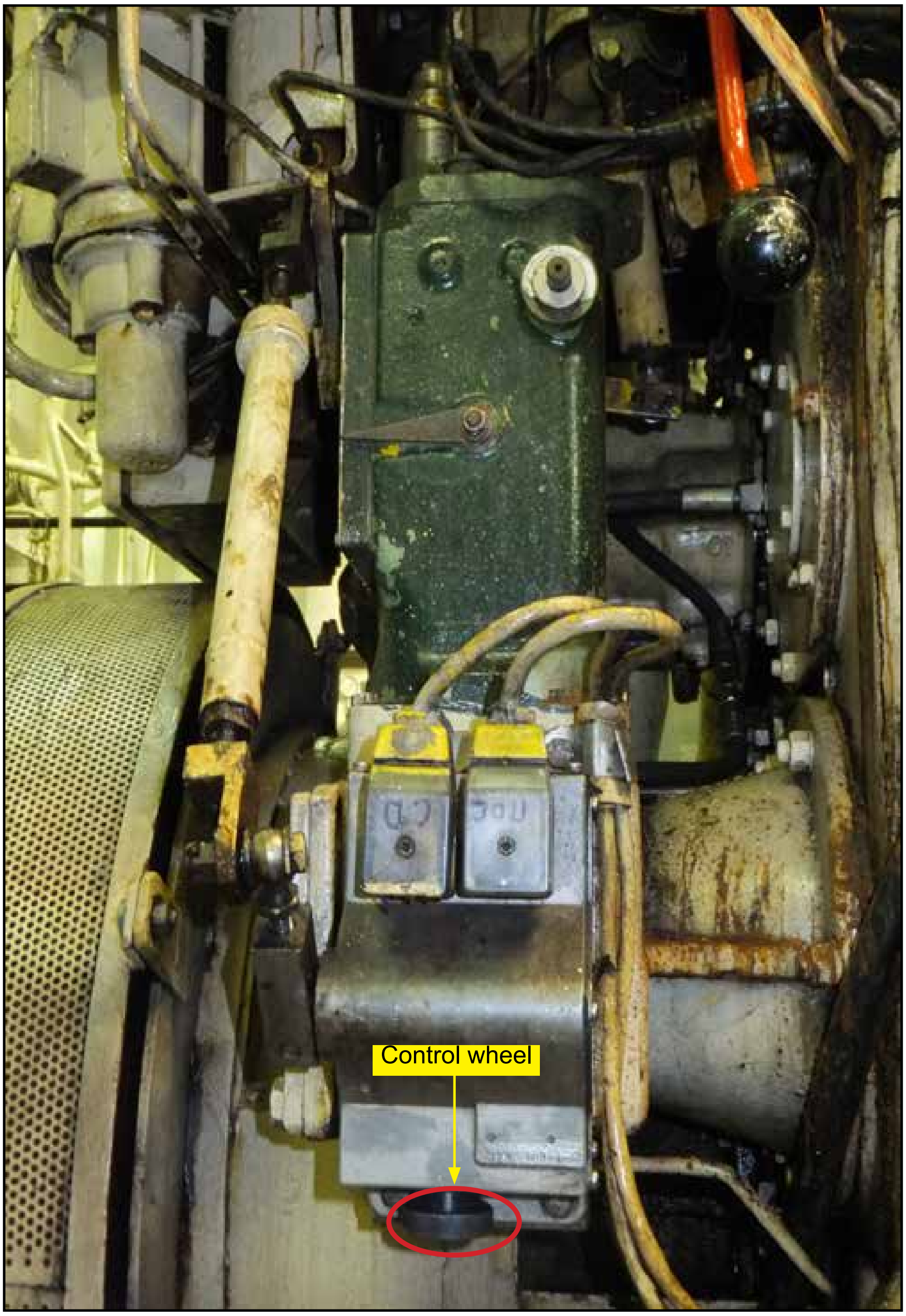

Figure 19: Main engine governor

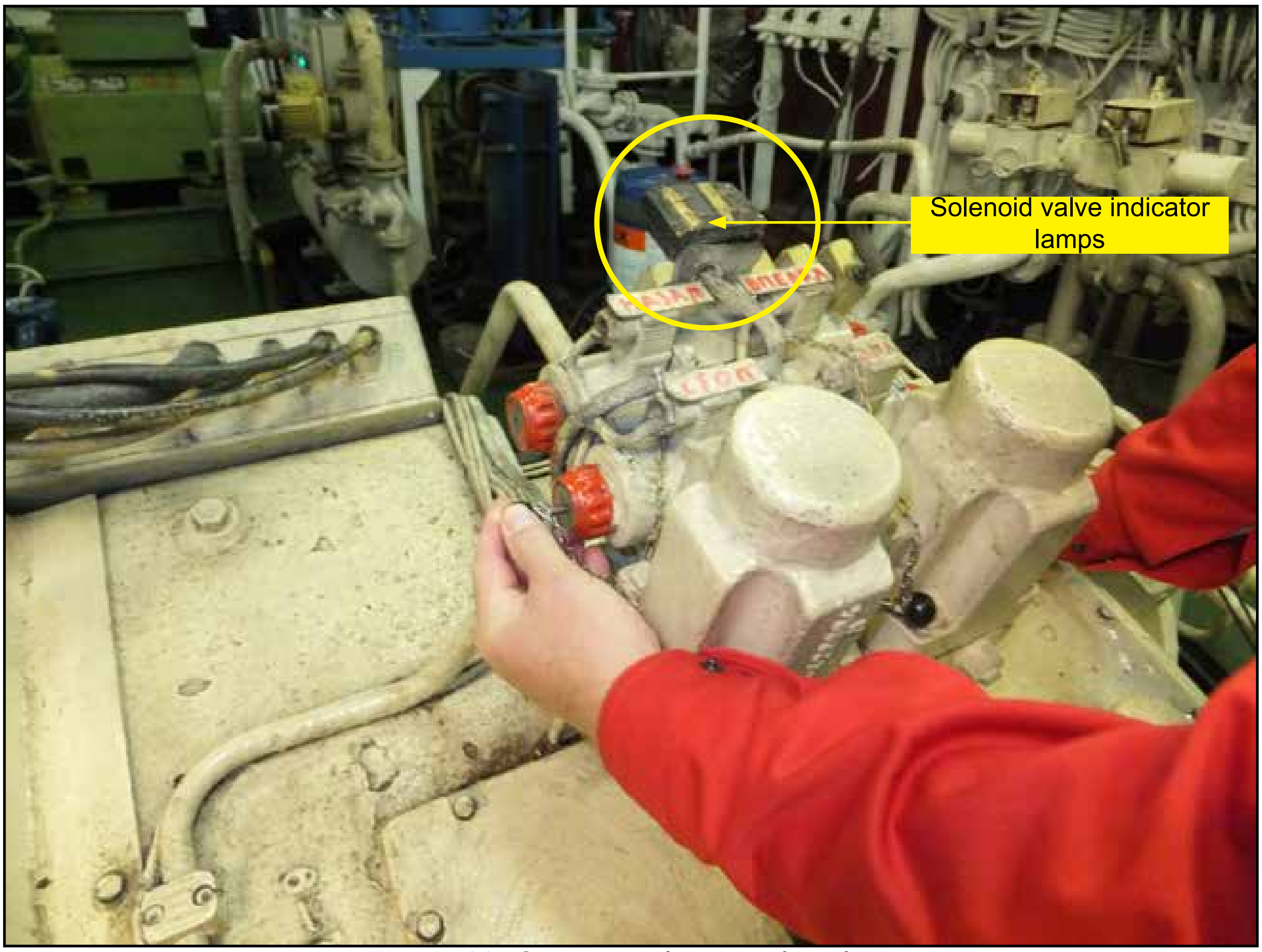

Figure 20: Gearbox solenoid valve block

Figure 21: ABB bridge control panel

The response times to clutch in the gearbox and increase engine speed following the movement of the bridge telegraph lever, detailed in ABB's operating instructions, were:

300 rpm - 450 rpm	*4s*	(Normal)
300 rpm – 600 rpm	*10s*	(Normal)

The response times of the main engine to increase/decrease speed with the clutch engaged, were:

600 rpm – 750 rpm	*30s*	(Normal)
600 rpm – 750 rpm	*10s*	(Emergency)
1000 rpm – 300 rpm	*5s*	(Normal)

During operation in automatic control, four red lamps adjacent to the control valve box on the gearbox **(Figures 20** and **22)** indicated which solenoids were energised, for example 'clutch in' and 'astern'. These lamps did not illuminate when operating in manual control.

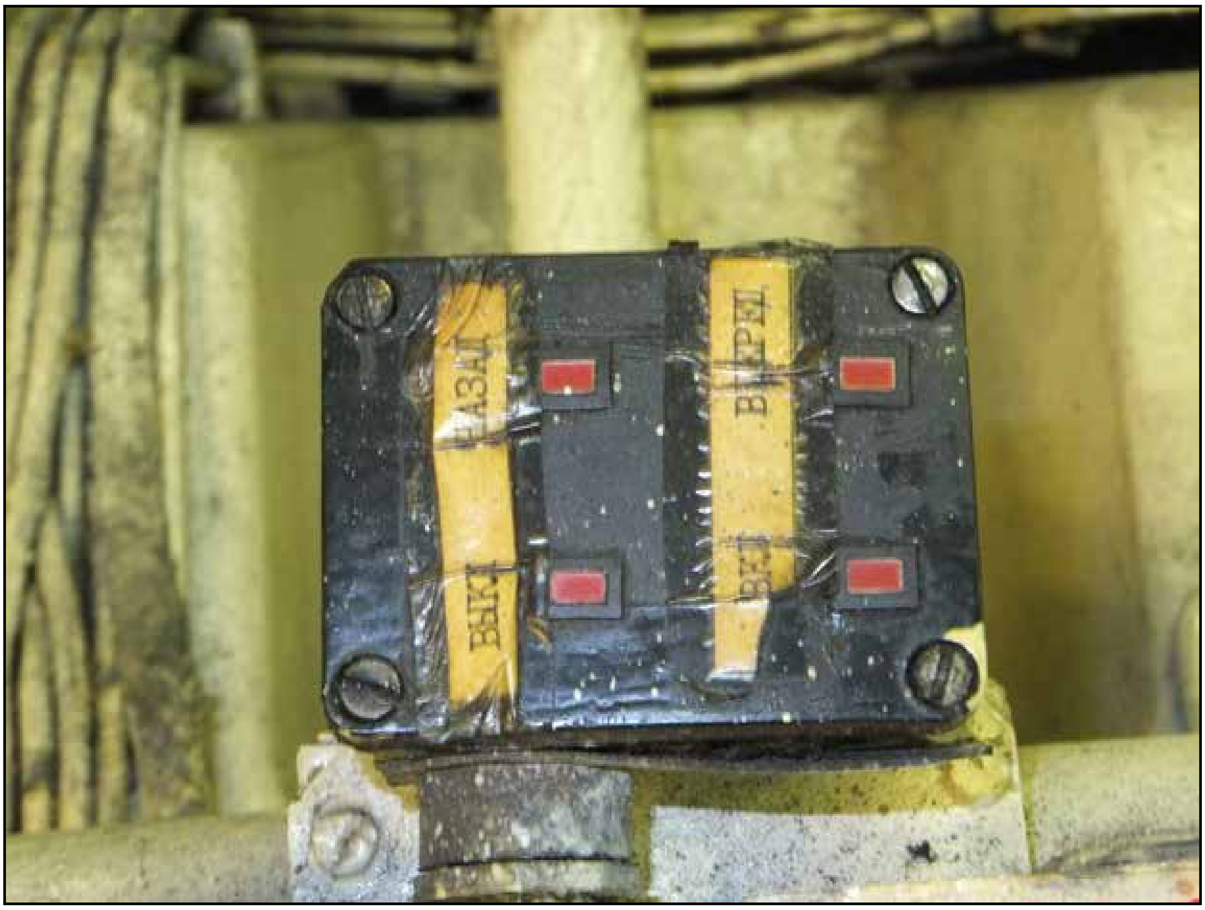

Figure 22: Solenoid valves indicator lamps

1.7.2 Recent defects

On 2 March 2012, *Alexander Tvardovskiy* grounded in Swedish waters following which the vessel's master was relieved of command. During the handover to his relief, the departing master passed on that he had experienced problems with the automatic engine control system. However, these problems did not contribute to the grounding.

On 29 March 2012, the newly-arrived master sent a fax to the vessel's technical superintendent that listed a number of deficiencies related to the vessel's inability to operate on Russian rivers, and described the automatic engine system as 'inoperable and in need of repair'.

Between 12 April and 25 May 2012, *Alexander Tvardovskiy* was in dry dock in Kaliningrad for the repair of the hull damage caused by the grounding. During this period, a representative from Dontechcenter inspected and refurbished the automatic engine control system. The work conducted included the replacement of an engine speed control potentiometer for the main engine fuel rack sited in the remote control unit, the adjustment of several system control units, and the repair of the remote 'emergency stop' control. The details of the adjustments and repairs were reported to an attending GL surveyor.

Alexander Tvardovskiy left Kaliningrad on 27 May 2012. During the vessel's departure, the automatic propulsion control system central processor failed. The device was re-started in accordance with the operating manual but the system's settings could not be recovered. The vessel continued on passage to sea.

During the 2 months between *Alexander Tvardovskiy* sailing from Kaliningrad until she arrived in Immingham on 29 July 2012, the automatic propulsion control system was unreliable during more than 50% of the occasions it was used during the vessel's port entries and departures. The time taken to engage or disengage the clutch when in automatic propulsion control was between 10 and 14 seconds. As a result, the master considered the automatic propulsion control system to be unsafe to use, particularly when manoeuvring in confined port areas.

During the crew changeover on 29 July 2012 in Immingham, both the oncoming master and chief engineer were informed that NWSC had been made aware of the problems with the automatic propulsion control system, and that the ship manager had advised that the system's performance would be investigated. The oncoming crew were also informed that the 'emergency stop' control for the main engine was not working. There is no evidence to show that the problems with the automatic propulsion control system or the 'emergency stop' control were reported to NWSC.

1.8 MANUAL CONTROL

1.8.1 Use

The use of manual control was considered by NWSC to be an acceptable alternative to the automatic propulsion control system, and left its use to the discretion of its masters. After sailing from Kaliningrad on 27 May, *Alexander Tvardovskiy*'s propulsion machinery was operated in manual control during the entry to and departure from a number of the 12 European ports the vessel visited before she arrived in Immingham. The exact number of occasions that manual control was used during this period is not known.

When *Alexander Tvardovskiy* entered Seaham, UK on 12 July 2012, the master opted to use manual control of the propulsion system due to the confined nature of the port. On entering the dock, the bridge telegraph was set to full astern to check the vessel's headway. This had little effect, and her bulbous bow made contact with the dock wall. The speed of impact was low and only the dock wall suffered minor damage. The embarked pilot was not informed that manual control was being used.

1.8.2 Procedure and manning

Instructions for the manual control of the propulsion machinery were posted in the engine room. The instructions were in Russian; a translated version is at **Annex A**.

On 1 August 2012, the manual control of the propulsion system was undertaken by the chief engineer, the second engineer and the electrician **(Figure 23)**. The electrician operated the engine room telegraph repeater indicator pointer **(Figure 24)** to confirm receipt of bridge orders, the chief engineer operated the solenoid control valves on top of the gearbox for the clutch and ahead or astern gears **(Figure 20)**, and the second engineer operated the control wheel on the main engine governor to control the engine speed **(Figures 19** and **25)**.

The second engineer was able to see the engine room telegraph repeater. The chief engineer standing by the gearbox control solenoids was too far from the engine room telegraph repeater to read it, so the electrician passed the orders to him. Due to the noise of running machinery in the engine room, the electrician relayed the orders by pointing forward with his hands and arms to indicate 'ahead' or by pointing aft to indicate 'astern'.

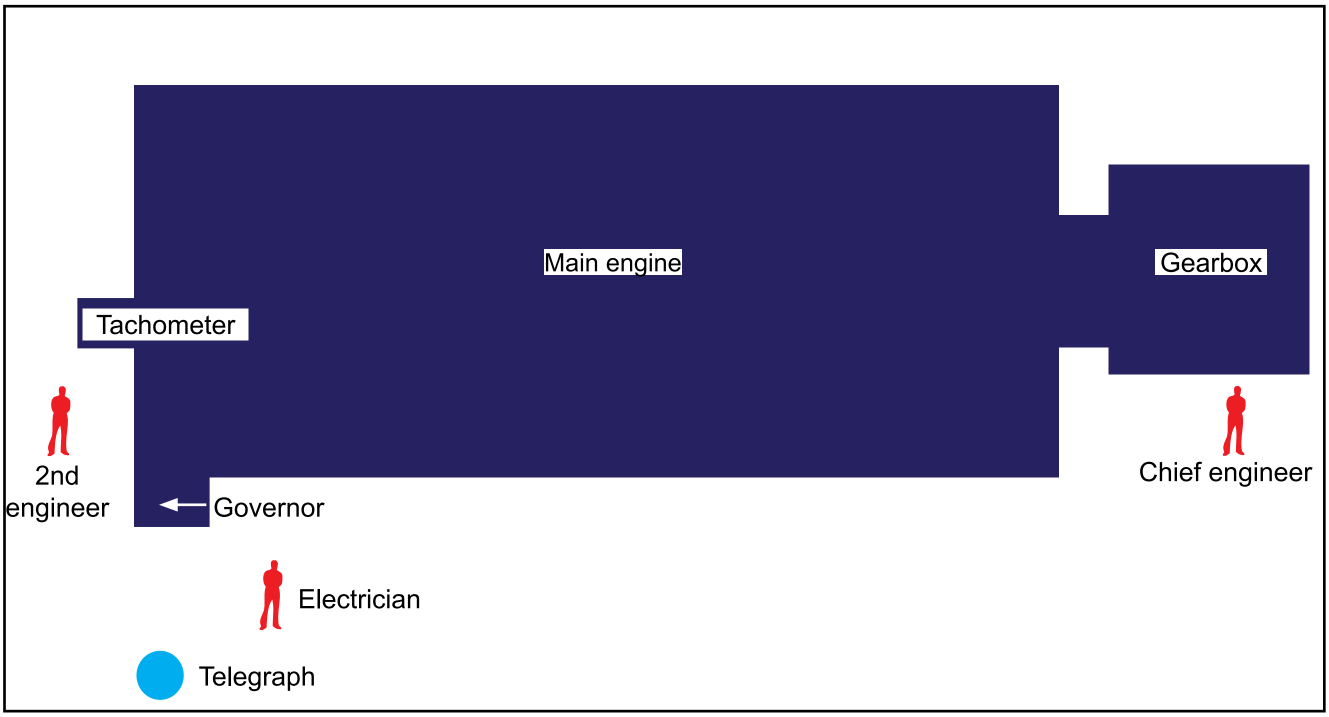

Figure 23: Positions of engineers

Figure 24: Engine room telegraph

Figure 25: Manual control of the main engine speed

The second engineer monitored the engine speed by observing a tachometer on the engine control panel. The chief engineer was able to check the direction of shaft rotation by comparing the shaft movement against a double-headed arrow which had been roughly painted onto a deck plate step above the propeller shaft **(Figure 26)**. This required the chief engineer to use a torch in order to see the shaft below the engine room deck plates, during which time he had to turn away from the electrician.

The chief engineer and the second engineer relied to some degree on changes in the engine noise due to either changes in speed or load to indicate the progress, or the completion of, the separate steps required when operating the engine in manual mode.

1.8.3 Operation on leaving Immingham

After *Alexander Tvardovskiy* left berth 2 in Immingham, the orders of 'dead slow astern', 'stop', 'slow ahead' and 'full ahead' were acknowledged by the electrician using the telegraph repeater indicator. The second engineer and the chief engineer also adjusted the local controls on the main engine and gearbox respectively to implement these orders, but the actual direction of the shaft's rotation was never confirmed. At the time of the collision with *UKD Bluefin*, all of the crew in *Alexander Tvardovskiy*'s engine room were under the impression that the main engine and the gearbox were driving the vessel ahead.

Figure 26: Signage showing the direction of shaft rotation in the engine room

1.9 VESSEL MANAGEMENT

1.9.1 General

On 31 January 2012, *Alexander Tvardovskiy*'s registration was changed from the Maltese flag administration to that of the Russian Federation. At about the same time, the vessel's management was changed to NWSC based in St. Petersburg, Russia. The vessel's classification society remained GL.

Responsibility for certifying that *Alexander Tvardovskiy* was being operated in accordance with the International Safety Management Code (ISM Code) rested with RS. RS had issued a Document of Compliance (DOC) to NWSC on 27 November 2009, which was accepted by GL and was last verified on 6 April 2012. Following an Initial Safety Management System (SMS) audit on board *Alexander Tvardovskiy* in February 2012, and the installation on board of a generic SMS, in hard copy, which had been developed by NWSC and certified by RS, RS issued the vessel's safety management certificate (SMC) on 20 June 2012.

1.9.2 The ship manager

NWSC is one of the largest shipping companies in Russia. It handles the import and export of general, bulk and oversize cargo, vessel towage, and transit shipments through the Volga-Baltic Waterway and the Saimaa Canal. NWSC's fleet of vessels call at 300 river and sea ports across 30 countries.

NWSC's fleet includes 65 vessels between 90m and 140m in length, and up to 5000gt. All of the vessels are capable of operating at sea, but 10 trade only on internal waters. Seven of the 65 vessels have a single propeller and operate only at sea. The vessels are entered in class with RS, GL and BV, and have an average age of 19 years.

NWSC employs 10 technical superintendents, all of whom are ex-chief engineers, and 10 marine superintendents, all of whom have at least 5 years' experience as master. One of the marine superintendents is also the designated person (DP). The marine superintendents oversee the implementation of the ISM Code and International Ship and Port Facility Security (ISPS) Code.

The technical superintendents visit the vessels on average two to three times per year, usually during classification society surveys, repair periods, change of crew, or when the ships are alongside the company's offices in St. Petersburg. A technical superintendent had visited *Alexander Tvardovskiy* in April 2012, four times during the dry docking in Kaliningrad in May 2012 and twice in Kaliningrad in August 2012.

1.9.3 Safety manual

NWSC's safety manual was written in Russian[3].

Section 7.4: *Ship operation and shipboard operations,* included:

According to possible consequences, the key ship operations are divided into special and critical. Special ship operations are considered to be operations during implementation of which mistakes may lead to dangerous situations or they are detected after an accident has occurred. Mistakes during implementation of critical ship operations lead right away to an accident or cause danger to the shipboard personnel, to the ship or may cause the threat of pollution…. Critical ship operations among others are:

- *Terminal (port) transportation operations – pilotage, mooring, anchoring etc;*
- *Dangerous and emergency operations (identified and unforeseen).*

Critical ship operations should be carried out under strict control, thus there should be a full confidence in qualifications, competence and professional readiness of the ship personnel who is carrying out these operations. Special attention should be given to the preventative ship operations averting emergency situations.

Section 10: *Maintenance of the ship and equipment* also included*:*

In order to implement the accepted concept of maintenance, the following should be provided:

- *Submission by the shipboard personnel of regular information on the technical condition of the ships, detected failures of the main ship structures and technical means, as well as reasons which have caused these failures (if they are known) and actions taken for the purpose of their elimination and prevention;*

And,

The main ship structures and technical means, the sudden failure of which creates dangerous situations, include the following:

- *The main engine (the serving systems, the alarm system, the automatic remote control unit);*

[3] Extracts from the safety and operation manuals have been translated from Russian in to English.

1.9.4 Onboard operation manual

The operation manual on board *Alexander Tvardovskiy* provided instructions on all aspects of the vessel's operation.

Section 6.6: *When approaching and arriving at a port,* included:

> *The watch engineer, after receiving a notification of approaching the port from the mate-on watch, should do the following:*
>
> - *When arriving at the port and during manoeuvres to be constantly at the main engines control panel, to repeat and execute all the orders sent from the pilot bridge; in case of the management of the main engines from the pilot bridge always be ready when required or on orders from the running bridge to take charge of controls.*

A range of checklists within the manual included requirements for the checking of critical equipment prior to port departure and when embarking and disembarking a pilot. The manual also required a completed pilot card to be handed to the pilot during the master/pilot exchange.

1.9.5 Vessel inspection, audit and investigation reports

Following *Alexander Tvardovskiy*'s arrival in Silloth, UK on 9 March 2012, a Port State Control (PSC) inspection of the vessel was undertaken by the Maritime and Coastguard Agency (MCA). The inspection identified 12 deficiencies, which led to a further deficiency relating to the ISM Code that stated:

> *As a result of the number of SOLAS related deficiencies identified during PSC inspection it appears that there is possible breakdown in ISM SMS on board. Company to undertake internal audit within 3 months and objective evidence left on board.*

In response, NWSC carried out an SMS audit on 16 and 17 April 2012. The audit highlighted several non-conformities, including:

- *Equipment checking procedures not executed; nor life saving or fire safety equipment;*
- *Procedures of everyday rounds and inspections of the ship mechanism, devices or systems are not executed;*
- *Rotas for machine department prepared disregarding vessel classification;*
- *Unsatisfactory performance of watch keeping organisation for navigation in confined space, in conditions of restricted visibility.*

On 2 May 2012, the Russian Department of Safe Navigation Control and Other Marine Activities in Ports issued its investigation report into the vessel grounding on 2 March 2012. The report concluded that four of the rules within the Convention on the International Regulations for Preventing Collisions at Sea, 1972 (the COLREGS) had been breached.

1.10 THE ISM CODE

The ISM Code requires every shipping company to develop, implement and maintain a safety management system.

Section 1.2 *Objectives,* includes:

1.2.2 Safety management objectives of the Company should, inter alia:

.2 assess all identified risks to its ships, personnel and the environment and establish appropriate safeguards:

Section 7 *Shipboard operations,* includes:

The Company should establish procedures, plans and instructions, including checklists as appropriate, for key shipboard operations concerning the safety of the personnel, ship and protection of the environment. The various tasks should be defined and assigned to qualified personnel.

Section 8 *Emergency preparedness* includes:

8.1 The Company should identify potential emergency shipboard situations, and establish procedures to respond to them.

Section 9 *Reports and analysis of non-conformities, accidents and hazardous occurrences,* includes:

9.1 The safety management system should include procedures ensuring that non-conformities, accidents and hazardous situations are reported to the Company, investigated and analysed with the objective of improving safety and pollution prevention.

Section 10 *Maintenance of the ship and equipment,* includes:

10.1 The Company should establish procedures to ensure that the ship is maintained in conformity with the provisions of the relevant rules and regulations and with any additional requirements which may be established by the Company.

1.11 SOLAS REQUIREMENTS

Alexander Tvardovskiy was built in 1996 to the International Convention for the Safety of Life at Sea (SOLAS) requirements, including the 1992 amendments (primarily fire safety), under the rules of RS.

SOLAS Regulation 31 (Machinery controls) within Chapter II-1: Construction – structure, stability, installations, Part C: Machinery installations is at **Annex B**. Among other things, the regulation requires vessels constructed before 1998 to be able to control the propulsion machinery in local control in the event of the failure of any part of the remote control system, and for propeller speed and direction of rotation indicators to be fitted on the navigation bridge. For vessels constructed on or after 1 July 1998, the Regulation also requires propeller speed and direction of rotation indicators to be fitted in the machinery control room and at the manoeuvring platform. The requirement for the newer vessels was introduced following the adoption of the IMO resolution, Maritime Safety Committee (MSC).47(66) in June 1996, which came into force on 1 July 1998.

SOLAS Article VIII states:

> *Unless expressly provided otherwise, any amendment to the present Convention made under this article, which relates to the structure of a ship, shall apply only to ships the keels of which are laid or which are at a similar stage of construction, on or after the date on which the amendment enters into force.*

As a result, although new safety equipment requirements are often applied to existing vessels, amendments to SOLAS construction regulations are not normally retrospectively applied to existing vessels (the grandfather clause[4]). This is due to, *inter alia*, the potential costs that the owners of older vessels might incur in updating their vessels. The range of equipment to which the clause is applied can vary between jurisdictions.

The retrospective application of SOLAS provisions relating to the structure of a ship is not clarified in the Convention. However, MSC/Circ.765 *Interim Guidelines for the Systematic Application of the Grandfather Clauses*, which was published on 23 July 1996, included:

> *2 In recent times, however, the acceptability of the grandfather clauses has been queried. With each constructional improvement of new ships, the gap in standards, i.e. safety and pollution prevention standards, between new and existing ships increases. Recognizing that it is often the record of existing ships that demonstrates the compelling need to improve on certain aspects of their standards, it seems quite unjustifiable that existing ships should be deliberately exempted from improvements of their standards. So, on the one hand, extensive and costly constructional modifications should be avoided on existing ships, while on the other hand, the standards of existing ships may become unacceptable when compared to requirements adopted for new ships only.*
>
> *3 ...'the guidelines', provide a strategy for avoiding undue gaps in standards between new and existing ships. The strategy aims to ensure that when such gaps could increase through the adoption of more stringent constructional requirements for new ships, the standards of existing ships would be likewise improved to an acceptable extent, although the measures to be taken may differ in nature from those agreed for new ships. Ideally, this would in the long run result in equivalent standards for new and existing ships.*

Although reiterated in subsequent MSC circulars, the guidelines have not been widely applied since their introduction.

1.12 CLASSIFICATION SOCIETY RULES

On 16 June 2008 *Alexander Tvardovskiy*'s classification society changed from RS to GL. The change of classification society followed an IACS procedure for the mutual acceptance of vessels between IACS members. The procedure required that

[4] The 'grandfather clause' is the practice of permitting existing vessels to operate to the standards applicable at the time they were built or as otherwise stated.

all items which were identified not to meet the international conventions were to be rectified. However, deviations between the rules of the two classification societies which lay outside the conventions were accepted by the receiving society, as were differences due to post-construction amendments to the conventions.

GL's rules regarding local operation of propulsion machinery include:

2.1 Local control station

To provide emergency operation of the propulsion plant a local control station is to be installed from which the plant can be operated and monitored.

2.1.3 In the case of gear and controllable pitch propeller systems, the local control indicators and control equipment required for emergency operation are to be installed at the main engines local control station.

Similar to other classification societies, GL requires to be informed immediately of any deficiencies or damage to hull and machinery that might affect the vessel's classification status. However, failing to report such a deficiency or damage to a classification society does not usually result in any form of reprimand to the vessel or her manager.

1.13 BRIDGE PROCEDURES GUIDE

The Bridge Procedures Guide, published by the International Chamber of Shipping (ICS), provides best practice in the safe conduct of navigation. The guidance includes:

1.2.7.2 Co-ordination and communication

A bridge team which has a plan that is understood and is well briefed, with all members supporting each other, will have good situational awareness. Its members will then be able to anticipate dangerous situations arising and recognise the development of a chain of errors, thus enabling them to take action to break the sequence.

3.3.3.4 Monitoring the pilotage

The safe progress of the ship should be monitored closely at all times.

Verbal orders from the pilot also need to be checked to confirm that they have been carried out correctly. This will include monitoring both the rudder angle and rpm indicators when helm and engine orders are given.

Guidance is also provided on the master/pilot exchange and pilot cards **(Annex C)**, on which space is allowed for equipment defects to be detailed.

Although *Alexander Tvardovskiy*'s operation manual referred to the Bridge Procedures Guide, a copy of the publication was not carried on board.

1.14 PORT STATE CONTROL

Information on the Merchant Shipping (Port State Control) Regulations 2011, which implement European Directive (2009/16/EC – port state control) into UK law, is provided in Merchant Shipping Notice (MSN) 1832(M). The Regulations require, inter alia:

> *UK pilots engaged in berthing or unberthing a ship, or engaged on a ship bound for a port in the UK or in transit within UK waters must immediately inform the port authority authorising them, or the MCA, or the authority of another coastal member State, as appropriate, whenever they learn in the course of their normal duties that there are apparent anomalies which may prejudice the safe navigation of the ship or which may pose a threat of harm to the marine environment. For these purposes a UK pilot means a pilot authorised under the Pilotage Act 1987 or a pilot boarding a ship in UK waters (regulation 19).*

1.15 SIMILAR ACCIDENTS

1.15.1 *Savannah Express*

On 19 July 2005, the 94483gt container vessel *Savannah Express*[5] made heavy contact with a linkspan at Southampton Docks after losing astern power while attempting to swing before going alongside. The linkspan was badly damaged.

Savannah Express had earlier suffered an engine failure as she approached the pilotage boarding area. She anchored and carried out repairs. Over an hour after leaving the anchorage, the pilot was informed that the cause of the engine failure had not been positively diagnosed, but no additional precautions were put in place and the harbour authority was not told.

Although the engineers on board were experienced and held appropriate STCW certificates, they resorted to disabling an electronic control system to enable a back-up system to take over. Unbeknown to the engineers, this resulted in insufficient hydraulic power being available to operate the engine astern.

1.15.2 *CFL Patron*

On 29 August 2010, the general cargo vessel *CFL Patron* suffered a controllable pitch propeller (CPP) failure while manoeuvring at 1.6 knots in the lock at Immingham[6]. Despite the master's attempts to recover control of the CPP system, the pitch remained at approximately 40% ahead, causing the vessel to accelerate. Although a forward spring was deployed and the tug *Guardsman* attempted to slow the vessel's progress, the vessel impacted heavily with the outer lock gates at a speed of 3.7 knots. The outer gate sustained major damage and subsequently sank. Both *CFL Patron* and the tug sustained minor damage. The cause of the CPP control power failure could not be determined.

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[5] MAIB Report 8/2006, on the investigation of the engine failure of *Savannah Express* and her subsequent contact with a linkspan at Southampton Docks, 19 July 2005. www.maib.gov.uk/publications/investigation_reports/2006/savannah_express.cfm

[6] www.maib.gov.uk/publications/completed_preliminary_examinations/completed_preliminary_examinations_2010/CFL_patron.cfm

1.15.3 *Grand Rodosi*

On 8 October 2010, the bulk carrier *Grand Rodosi* collided with the fishing vessel *Apollo S* in Port Lincoln, South Australia. The Australian Transport Safety Bureau (ATSB) investigation report included:

> *…despite the pilot ordering astern movements, the ship's main engine did not run astern in the 5 minutes leading up to the collision. The chief engineer, who was operating the main engine start/fuel lever in the engine room control room, did not allow sufficient time for starting air to stop the ahead running engine. Consequently, when fuel was introduced into the engine, it continued to run ahead, despite the astern telegraph orders.*
>
> *The investigation also found that the chief engineer's mistake was not identified by anyone on the ship's bridge or in the engine room control room until after the collision; that the master/pilot information exchange was less than optimal; and that bridge resource management principles could have been better applied during the passage to the berth.*
>
> *It is of paramount importance that pilots and ships' crews maintain awareness of main engine movements and check engine tachometers following every movement to ensure that the engine is operating in the desired direction. This is particularly important when main engines are being operated in manual control.*
>
> *In addition, pilots and the bridge teams should ensure that all necessary information is exchanged at the beginning of the pilotage,…*

1.15.4 *Alexander Kuprin*

On 25 October 2012, *Alexander Kuprin,* a sister vessel to *Alexander Tvardovskiy* and also managed by NWSC, was under pilotage inbound to Goole, UK. While preparing to enter the lock under minimal engine power ahead, several mooring ropes were passed ashore. However, the vessel's forward spring unexpectedly released from its bollard. As a result, the bow rapidly approached the lock gates. Despite the pilot ordering 'full astern' on two separate occasions, the vessel did not respond and her bow made contact with the concrete entrance to the lock, causing damage to both the vessel and the lock.

On leaving Goole 4 days later, the pilot on board *Alexander Kuprin* ordered 'full ahead' and 'hard to starboard' to get the vessel clear of the lock and to turn into the tide. However, even though the bow thruster was used to assist the turn, the engine was slow to respond and the vessel was unable to turn across the flood tide. Instead, she continued across the river and grounded.

The method of propulsion control used during the vessel's arrival and departure is not known.

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 THE COLLISION

After slipping from her berth, *Alexander Tvardovskiy* moved slowly astern as intended. However, it is evident from the vessel's continued movement towards *UKD Bluefin* after the engine telegraph was changed to 'stop', 'slow ahead' and then 'full ahead', that the propeller shaft was turning astern throughout the manoeuvre and its direction was never reversed so it would drive ahead.

For the departure, *Alexander Tvardovskiy*'s propulsion was controlled manually using local controls on the main engine and the gearbox. Therefore, the failure to change the gearbox setting from 'astern' to 'ahead' could only have resulted from the incorrect operation of gearbox solenoid valves. However, because this error was not detected by the crew in the engine room or by the bridge team, the resulting action taken to avoid colliding with *UKD Bluefin* only exacerbated the situation.

In response to the movement of the telegraph to 'full ahead', the vessel's engine speed was increased and, with *Alexander Tvardovskiy*'s gearbox still engaged astern, she accelerated into, rather than away from, the dredger. Although the master of *UKD Bluefin* was concerned by the cargo ship's approach, he had insufficient time in which to take successful avoiding action.

2.3 OPERATION OF SOLENOID VALVES

In manual control, the operation of the gearbox solenoids on board *Alexander Tvardovskiy* determined the vessel's direction of movement and was fundamental to the vessel's safety. Therefore, the chief engineer's role was pivotal.

To operate the gearbox effectively, the chief engineer needed to concentrate on the directional orders relayed by the electrician and to co-ordinate his actions with the actions of the second engineer using the changes in engine noise as a reference. However, the chief engineer had only recently joined the vessel and was not well practised or drilled in the local operation of the solenoid valves. Nonetheless, he had seemingly operated the solenoids without difficulty during the tests conducted alongside prior to the vessel sailing. The chief engineer had also 'clutched in the astern gear' as ordered after slipping, and then operated the solenoid valves as instructed after the collision. Therefore, he clearly understood the procedure to be followed. Given that the chief engineer was under the impression that the ahead gear was engaged at the time of the collision, it is also apparent that he thought that he selected both the 'ahead' and 'clutch in' solenoids in response to the 'ahead' order that had been indicated by the electrician.

There are several ergonomic factors which potentially influenced the actions and performance of the chief engineer that ultimately led to the unintended engagement of the 'astern' gear. These included his physical separation from the other engineers **(Figure 23)**, the rudimentary communications, and the noise inside the engine room. However, it is also possible that the chief engineer's erroneous operation of the ‘astern’ instead of the ‘ahead’ solenoid valve was influenced by the orientation of the valve block. Although the ‘ahead’ and the ‘astern’ solenoids mounted on the valve block were correctly labelled, the ‘ahead’ valve was aft and the ‘astern’ valve was forward **(Figure 20)**, an arrangement that was possibly counter-intuitive.

It is evident that the procedure for manual control posted in the engine room **(Annex A)** omitted the operation of the appropriate solenoid valve when changing from ‘ahead’ to ‘astern’ and vice versa. However, although this was a crucial step and its omission was a significant oversight, the chief engineer’s correct operation of the solenoid valves both before and after the accident indicates that it was not a contributory factor on this occasion.

Once the ‘astern’ rather than the ‘ahead’ solenoid was operated, the error could have been quickly identified and rectified had the chief engineer checked that the propeller shaft was rotating in the desired direction. However, as the indicator lamps on the solenoid valve block did not work when in manual control, this was only possible by referencing the shaft’s movement against the double-headed arrow marked above the deck plates **(Figure 26)**.

2.4 BRIDGE TEAMWORK AND MANAGEMENT

The erroneous engagement of the ‘astern’ solenoid instead of the ‘ahead’ solenoid was serious, but it occurred when *Alexander Tvardovskiy* was travelling at a very slow speed in the dock ‘square’. Therefore, there was ample time for the error to be detected and rectified by *Alexander Tvardovskiy*’s bridge team before the risk of collision with *UKD Bluefin* developed.

The interval between the order being given for ‘dead slow astern’ and the collision was at least 2 minutes. During this time, neither the chief officer nor the master looked at the propeller indicator on the bridge console **(Figure 4)** or observed the propeller wash **(Figure 6)**. Consequently, they did not realise that the propeller was still rotating astern until after the collision. Ensuring that bridge teams are well briefed and that propulsion indicators are monitored when a vessel is manoeuvring in a confined area are key elements of bridge teamwork and resource management that are emphasised in the Bridge Procedures Guide. On this occasion, in common with the circumstances of the collision involving *Grand Rodisi* **(Paragraph 1.15.3)**, effective teamwork and adequate support to the pilot was lacking.

As a result, although the pilot, the master and the chief officer all recognised that *Alexander Tvardovskiy* was closing on *UKD Bluefin,* none of them knew why. The master and the chief officer were aware that the gearbox was being operated in manual control, but both officers placed total reliance in the position of the bridge telegraph as if the engine and gearbox were in automatic control. Such reliance was clearly unjustified and led to the vessel accelerating even faster astern in response to the order of ‘full ahead’.

As the pilot was not informed that the vessel was operating in manual control, and that he was also probably unaware that neither the master nor the chief officer was monitoring the propeller indicator, he assumed that his orders had been followed correctly. Had the pilot known that the main engine and gearbox were being controlled manually, it is likely that he would have paid more interest in the response to his orders. In this case, and that of *Savannah Express* **(Paragraph 1.15.1)**, the failure to pass important information regarding how a vessel is being controlled, seriously compromised the pilot’s ability to anticipate potential limitations and risks.

Prior to joining *Alexander Tvardovskiy*, the master had spent 7 years in command of twin screw vessels, and he was relatively unpractised in manoeuvring a vessel with a single propeller. Therefore, his preference to gain some practical ship-handling experience on board, was understandable. However, it is extremely unlikely that the pilot would have readily accepted the master's decision not to secure the tug if he had been made aware that the vessel's machinery was being operated in manual control, particularly in view of the limited manoeuvring space available in Immingham dock and lock.

2.5 MANUAL CONTROL PROCEDURES

Given the unreliability and the slow response times of the automatic propulsion control system experienced on board *Alexander Tvardovskiy*, the masters' preference to use the seemingly faster manual control, particularly in confined port areas was understandable. However, because of the poor ergonomics in the engine room and the procedures adopted, it is of serious concern that manual control was used as an equivalent alternative to automatic propulsion control over a prolonged period.

The use of manual control required far more human involvement than the use of the automatic control system. Therefore, the risk of human error was considerably greater. Unfortunately, the procedures adopted on board *Alexander Tvardovskiy* were not sufficiently robust to help mitigate this risk.

In particular, although the electrician confirmed receipt of a propulsion order from the bridge, using the telegraph repeater, no confirmation was passed from the engine room to the bridge after the order had been implemented. In addition, although the chief engineer and second engineer needed to closely co-ordinate their actions, they were not well practised in their tasks, they could not readily see each other, and they were unable to communicate with each other. Furthermore, the expectation that the chief engineer would routinely turn away from the electrician, whose orders he was following, to check the direction of propeller rotation using a torch was unrealistic.

The arrangements for the local control of *Alexander Tvardovskiy*'s propulsion did not meet current standards, but were allowed to persist due to the application of grandfather clauses **(see paragraph 1.11)**. While the arrangements enabled the propulsion to be controlled adequately to return the vessel to port in the event of an automated propulsion control system failure, they were not suitable as the primary and sole reliable method of controlling the vessel's propulsion over a prolonged period.

2.6 PROPELLER INDICATION

Alexander Tvardovskiy was built in 1996, and therefore the vessel was not required to have a propeller speed and direction indicator sited adjacent to the gearbox or the engine room telegraph. Although the 1998 amendments to SOLAS required vessels to have propeller indicators fitted at the local manoeuvring platforms, this requirement was not retrospectively applied to existing vessels. As the rules of GL, in line with other classification societies, implement the international conventions, it did not require a propeller indicator to be fitted in the engine room when the vessel transferred classification in 2008.

Grandfather clauses were written in to international maritime regulations in order to minimise the potential costs to owners of older vessels. Such costs might include:

- The cost of removing existing arrangements
- The cost of alterations to structure required to accommodate the new arrangement
- The loss of earnings while a vessel is out of service being modified
- A potential reduction in a vessel's earning capability.

Where a SOLAS amendment *relates to the structure of a ship* as indicated in *SOLAS VIII* **(Paragraph 1.11)**, the concern regarding cost is frequently warranted. However, in MSC/Circ 765 the IMO recognises the need for a strategy to prevent gaps in the standards of new and older vessels. In short, the 'grandfather clause' should not be used as a reason to completely exempt older vessels from amended regulations that are intended to improve safety. Every effort must be made to comply with the spirit of the amendments to the regulations.

Given that fitting a propeller indicator at the manoeuvring platform on board *Alexander Tvardovskiy* would probably have been relatively inexpensive, and that a propeller indicator, which could be easily seen by the chief engineer or the electrician, would have improved the likelihood of human error being detected early, the rigid application of the 'grandfather clause' by RS and then GL to exempt the vessel from this requirement seems to have been unjustified.

Although the proposed strategy in MSC/Circ 765 has received little support since its publication in 1996, the adoption of the 'grandfather clause' is likely to continue to be detrimental to safety unless more is done to address the resulting lower standards on board exempted vessels. The need for the rules of classification societies to allow a more holistic and pragmatic view regarding the application of the 'grandfather clause' in relation to SOLAS amendments is compelling.

2.7 DEFECT REPORTING

It is apparent from the masters' handovers in March and July 2012, the repairs in Kaliningrad in May 2012, and the tests conducted by GL on 2 August 2012, that the automatic propulsion control system fitted on board *Alexander Tvardovskiy* was not working as designed. This was confirmed by the repairs that were subsequently made to the system in Kaliningrad in August 2012, following the collision.

It is likely that the increase in the engine's idle speed from 300rpm to 550rpm **(Paragraph 1.4)**, which had possibly developed gradually, would have first increased the time for the clutch to engage and disengage in excess of the manufacturer's guide times **(Paragraph 1.7.1)**. This supports the masters' estimates of response times being between 10 and 14 seconds. Once the idle speed had increased to above 450rpm, the maximum clutch engagement speed, the automatic operation of the clutch through the bridge control system would have been intermittent at best.

The main engine and associated systems, including the automatic control system, were designated as critical systems within the vessel's SMS. As such, the automatic propulsion control system was required to receive special attention to prevent failure and avert emergency situations arising. In this case, the lack of evidence to show that the ongoing problems with both the system and the 'emergency stop' for the main engine were reported to NWSC or GL, indicates that the vessel's master between March and July 2012 did not recognise the inherent and increased risk of operating in manual control and that he was content to 'live with the problem'. This is of concern, particularly in view of the vessel's near miss on entering Seaham on 12 July 2012 **(Paragraph 1.8.1)** and the uncertainty of the performance of the automatic propulsion control system even in open water, where the need to manoeuvre without notice was a constant possibility.

Furthermore, as manual operation of the propulsion machinery potentially impacted on the vessel's manoeuvrability, the embarked harbour pilots should have been informed of its use. The operation of the vessel's propulsion in local control due to the inoperability of automatic control from the bridge was a significant departure from the vessel's expected operation. As such, it prejudiced the vessel's safe operation and warranted reporting action to be taken by the pilot in accordance with the requirements of the Merchant Shipping (Port State Control) Regulations 2011.

The failure to consider the inoperability of the vessel's primary means of propulsion control as a defect ultimately led to the collision in Immingham, which resulted in three ships being taken out of service at considerable financial cost. It is therefore astonishing that the continued inoperability of the automatic propulsion control system was not reported to the embarked pilot during the vessel's eventual departure from Immingham on 10 August 2012.

2.8 SAFE OPERATION

NWSC considered that its masters should have the discretion to decide when manual control of propulsion was appropriate. This view was implicit in the instructions provided in the operations manual on board *Alexander Tvardovskiy* **(Paragraph 1.9.4)**. However, the need to routinely use manual control, except during drills, when the automated control was fully serviceable is questionable. In addition, the engine room ergonomics and the procedures adopted on board the vessel made the operation of the propulsion in local control suitable for use only as a last resort. Unlike the control of the propulsion machinery from the control room which is found on other vessels, the use of local control on board *Alexander Tvardovskiy* was nowhere near to being a suitable alternative to the automatic propulsion control system.

The MCA report of 9 March 2012, the SMS audit by NWSC on 16 and 17 April 2012, the findings of the Russian maritime authorities regarding the vessel's grounding, and GL's reports to RS and the Russian maritime authorities in August 2012, identified a number of shortcomings in the safety management on board *Alexander Tvardovskiy* **(Paragraphs 1.4 & 1.9.5)**. These shortcomings alone indicated that the onboard safety management system was not fully effective.

NWSC's technical superintendents had visited *Alexander Tvardovskiy* at regular intervals since her acquisition at the beginning of 2012. The vessel's safety management system had also merited the issue of an SMC by RS 5 months later. Nonetheless, it is evident from:

- The failure of the crew to report the unreliable performance of the automatic propulsion control system and the inoperative main engine 'emergency stop', both of which were critical systems, to NWSC, GL and the harbour pilots;

- The prolonged use of local or manual control without the risks being appreciated or assessed; and

- The failure to monitor the propulsion indicator on the bridge even when operating in manual control,

that more focus on safety needs to be applied to the operation and maintenance of the vessel's critical equipment, and more effective bridge teamwork, is required on board if the requirements of the company's safety and operations manuals, as well as the ISM Code are to be adhered to. Given the recent manoeuvring accidents involving *Alexander Tvardovskiy*'s sister vessel *Alexander Kuprin* **(Paragraph 1.15.4)**, it is possible that other vessels in NWSC's fleet have similar deficiencies.

SECTION 3 - CONCLUSIONS

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

1. After the engine telegraph was changed to ‘stop’, ‘slow ahead’ and then ‘full ahead’, the direction the propeller shaft was turning was never reversed due to the incorrect operation of the gearbox solenoid valves. [2.2]

2. Factors which potentially influenced the chief engineer’s operation of the solenoid valves included the ergonomics inside the engine room, notably the orientation of the valve block. [2.3]

3. The incorrect operation of the solenoid valves was not detected because the chief engineer did not check the direction of the rotation of the propeller shaft after operating the ‘astern’ solenoid valve. [2.3]

4. Neither the master nor the chief officer monitored the propeller indicator on the bridge and consequently they never realised that the propeller was still going astern until after the collision. [2.4]

5. The pilot probably did not question the master’s decision not to secure the tug or monitor that his orders were complied with because he was unaware that the vessel was operating in manual control. [2.4]

6. The failure to pass important information regarding how the vessel was being controlled, seriously compromised the pilot’s ability to anticipate potential limitations and risks. [2.4]

7. The procedures adopted on board *Alexander Tvardovskiy* for the use of manual control of the main engine and gearbox were not robust and did not help to mitigate the increased risks caused by the high level of human involvement. [2.5]

8. The expectation that the chief engineer would routinely turn and check the direction of the propeller using a torch after operating the solenoid valves was unrealistic. [2.5]

9. Unlike vessels built after 1998, the vessel did not require a propeller direction and speed indicator to be fitted in the engine room. [2.6]

10. The rigid application of the ‘grandfather clause’ by RS and then GL to exempt the vessel from the SOLAS requirement to have a propeller direction and speed indicator fitted at the manoeuvring platform seems to have been unjustified. [2.6]

11. The need for the rules of classification societies to allow a more holistic and pragmatic view regarding the application of the ‘grandfather clause’ in relation to SOLAS amendments is compelling. [2.6]

12. The vessel’s master between March and July 2012 did not recognise the inherent and increased risk of operating in manual control, and there is no evidence to show that the problems experienced with the bridge control system were reported to the ship manager after the system was repaired in May 2012. [2.7]

13. Although the ship manager considered manual control of a vessel's propulsion was an option to be used at its masters' discretion, it was only suitable for use in emergencies on board *Alexander Tvardovskiy*. [2.8]

14. More focus on safety needs to be applied to the operation and maintenance of the vessel's critical equipment, and more effective bridge teamwork, is required on board if the requirements of the company's safety and operations manuals, as well as the ISM Code, are to be adhered to. [2.8]

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

1. The operation of the vessel's propulsion in local control was a significant departure from the vessel's expected operation. As such, it prejudiced the vessel's safe operation and warranted reporting action to be taken by the pilot in accordance with the requirements of the Merchant Shipping (Port State Control) Regulations 2011. [2.7]

SECTION 4 - ACTION TAKEN

4.1 ACTIONS TAKEN BY OTHER ORGANISATIONS

JS North-Western Shipping Company has:

Undertaken an internal investigation into the accident **(Annex D)**. The investigation resulted in:

- The master being reprimanded, and a warning given to the chief engineer.
- More detailed instructions concerning the technical specifications of propulsion systems being given to its vessels' technical staff.
- A requirement for chief engineers to have relevant prior experience before being sent to certain vessels.

The company has also taken steps to:

- Implement recommendations made by the Russian North-Western State Department of River and Sea Control (see below)
- Familiarise its masters and watchkeeping officers on board its vessels with the circumstances of this accident.
- Improve the reliability of the engine controls systems through additional inspections and regular training.

The **Russian North-Western State Department of River and Sea Control** has:

Conducted its own investigation into the collision in Immingham. The investigation report **(Annex E)** concluded that:

- The chief engineer had incorrectly operated the main engine gearbox while in manual control.
- The master had breached various methods and means of operating the vessel in restricted waters.

The investigation report recommended that the technical condition of the vessel must meet all required standards, and tugs must be used where doubts over safety remained.

Humber Estuary Services has:

- Introduced a revised master/pilot exchange card. This incorporates, among other things, a requirement for the master and pilot to sign a declaration of the card contents **(Annex F)**.

SECTION 5 - RECOMMENDATIONS

Germanischer Lloyd is recommended to:

2013/209 Propose to the International Association of Classification Societies that its members apply the SOLAS requirements regarding the provision of indication at propulsion control positions, particularly on vessels where only two methods of control are available, regardless of the vessel's age.

The **UK Major Ports Group Limited** is recommended to:

2013/210 Work with national pilot organisations to develop master/pilot exchange procedures in order to ensure:

- The modes of propulsion control available and the mode of propulsion control in use on board vessels when entering and leaving United Kingdom ports, are clearly identified.

- Appropriate control measures to be adopted are agreed in circumstances where the optimum method of control is either not available or not in use.

The **International Chamber of Shipping** is recommended to:

2013/211 At the next revision of its Bridge Procedures Guide, emphasise the importance of port pilots being notified of all defects which affect a vessel's manoeuvrability, and the potential consequences of failing to do so.

JS North-Western Shipping Company is recommended to:

2013/212 Take measures to ensure that the safety management of and on board its vessels is robust taking into account, *inter alia:*

- The importance of the timely reporting and repair of defects to critical systems.

- The risks and limitations of operating propulsion systems in manual control.

- The need for comprehensive master/pilot exchanges.

- The importance of bridge teamwork regarding briefing, monitoring of equipment and support to pilots.

Marine Accident Investigation Branch
May 2013

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

Annex A

Operating instructions for the manual operation of main engine and gearbox

Annex A

Translation of operating instructions for manual operation of main engine and gearbox

1. Change in engine speed

   - On receipt of a bridge order, the telegraph pointer should be rotated to match the bridge order. There is no sound signal.
   - The engine speed should be adjusted using the governor control wheel. Rotate anticlockwise to reduce engine speed, and clockwise to increase.

2. De-clutching and changing direction

   - On receipt of a bridge order, the telegraph pointer should be rotated to the stop position
   - The governor should be adjusted to reduce the engine speed to 360-370rpm
   - Operate the gearbox de-clutch solenoid valve
   - On receipt of a bridge order for ahead or astern, the telegraph pointer should be rotated to match the bridge order
   - Operate the gearbox clutch-in solenoid valve (engine speed should be 350 rpm)
   - On receipt of a bridge order, the engine speed should be adjusted using the governor control wheel.

SOLAS Chapter II-1, Part C, Regulation 31

machinery space or the main machinery control room. This system shall include means to prevent the propelling thrust from altering significantly when transferring control from one location to another;

.6 it shall be possible to control the propulsion machinery locally, even in the case of failure in any part of the remote control system;

.7 the design of the remote control system shall be such that in case of its failure an alarm will be given. Unless the Administration considers it impracticable the preset speed and direction of thrust of the propellers shall be maintained until local control is in operation;

.8 indicators shall be fitted on the navigation bridge for:

.8.1 propeller speed and direction of rotation in the case of fixed pitch propellers;

.8.2 propeller speed and pitch position in the case of controllable pitch propellers;

.9 an alarm shall be provided on the navigation bridge and in the machinery space to indicate low starting air pressure which shall be set at a level to permit further main engine starting operations. If the remote control system of the propulsion machinery is designed for automatic starting, the number of automatic consecutive attempts which fail to produce a start shall be limited in order to safeguard sufficient starting air pressure for starting locally.

3 Where the main propulsion and associated machinery, including sources of main electrical supply, are provided with various degrees of automatic or remote control and are under continuous manual supervision from a control room the arrangements and controls shall be so designed, equipped and installed that the machinery operation will be as safe and effective as if it were under direct supervision; for this purpose regulations 46 to 50 shall apply as appropriate. Particular consideration shall be given to protect such spaces against fire and flooding.

4 In general, automatic starting, operational and control systems shall include provisions for manually overriding the automatic controls. Failure of any part of such systems shall not prevent the use of the manual override.

5 Ships constructed on or after 1 July 1998 shall comply with the requirements of paragraphs 1 to 4, as amended, as follows:

.1 paragraph 1 is replaced by the following:

"**1** Main and auxiliary machinery essential for the propulsion, control and safety of the ship shall be provided with effective means for its operation and control. All control systems essential for the propulsion, control and safety of the ship shall be independent or designed such that failure of one system does not degrade the performance of another system.";

.2 in the second and third lines of paragraph 2, the words "and the machinery spaces are intended to be manned" are deleted;

.3 the first sentence of paragraph 2.2 is replaced by the following:

"**.2** the control shall be performed by a single control device for each independent propeller, with automatic performance of all associated services, including, where necessary, means of preventing overload of the propulsion machinery.";

.4 paragraph 2.4 is replaced by the following:

"**.4** propulsion machinery orders from the navigation bridge shall be indicated in the main machinery control room and at the manoeuvring platform;";

.5 a new sentence is added at the end of paragraph 2.6 to read as follows:

"It shall also be possible to control the auxiliary machinery, essential for the propulsion and safety of the ship, at or near the machinery concerned;" and

.6 paragraphs 2.8, 2.8.1 and 2.8.2 are replaced by the following:

"**.8** indicators shall be fitted on the navigation bridge, the main machinery control room and at the manoeuvring platform, for:

.8.1 propeller speed and direction of rotation in the case of fixed pitch propellers; and

.3 an arrangement such that, where hydraulic power systems are interconnected, loss of hydraulic fluid from one system shall be detected and the defective system isolated either automatically or from the navigation bridge so that the other system remains fully operational.

Regulation 30

Additional requirements for electric and electrohydraulic steering gear

1 Means for indicating that the motors of electric and electrohydraulic steering gear are running shall be installed on the navigation bridge and at a suitable main machinery control position.

2 Each electric or electrohydraulic steering gear comprising one or more power units shall be served by at least two exclusive circuits fed directly from the main switchboard; however, one of the circuits may be supplied through the emergency switchboard. An auxiliary electric or electrohydraulic steering gear associated with a main electric or electrohydraulic steering gear may be connected to one of the circuits supplying this main steering gear. The circuits supplying an electric or electrohydraulic steering gear shall have adequate rating for supplying all motors which can be simultaneously connected to them and may be required to operate simultaneously.

3 Short circuit protection and an overload alarm shall be provided for such circuits and motors. Protection against excess current, including starting current, if provided, shall be for not less than twice the full load current of the motor or circuit so protected, and shall be arranged to permit the passage of the appropriate starting currents. Where a three-phase supply is used an alarm shall be provided that will indicate failure of any one of the supply phases. The alarms required in this paragraph shall be both audible and visual and shall be situated in a conspicuous position in the main machinery space or control room from which the main machinery is normally controlled and as may be required by regulation 51.

4 When in a ship of less than 1,600 gross tonnage an auxiliary steering gear which is required by regulation 29.4.3 to be operated by power is not electrically powered or is powered by an electric motor primarily intended for other services, the main steering gear may be fed by one circuit from the main switchboard. Where such an electric motor primarily intended for other services is arranged to power such an auxiliary steering gear, the requirement of paragraph 3 may be waived by the Administration if satisfied with the protection arrangement together with the requirements of regulation 29.5.1 and .2 and 29.7.3 applicable to auxiliary steering gear.

Regulation 31

Machinery controls

1 Main and auxiliary machinery essential for the propulsion and safety of the ship shall be provided with effective means for its operation and control.

2 Where remote control of propulsion machinery from the navigation bridge is provided and the machinery spaces are intended to be manned, the following shall apply:

.1 the speed, direction of thrust and, if applicable, the pitch of the propeller shall be fully controllable from the navigation bridge under all sailing conditions, including manoeuvring;

.2 the remote control shall be performed, for each independent propeller, by a control device so designed and constructed that its operation does not require particular attention to the operational details of the machinery. Where multiple propellers are designed to operate simultaneously, they may be controlled by one control device;

.3 the main propulsion machinery shall be provided with an emergency stopping device on the navigation bridge which shall be independent of the navigation bridge control system;

.4 propulsion machinery orders from the navigation bridge shall be indicated in the main machinery control room or at the manoeuvring platform as appropriate;

.5 remote control of the propulsion machinery shall be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there shall be an indicator showing which location is in control of the propulsion machinery. The transfer of control between the navigation bridge and machinery spaces shall be possible only in the main

Bridge Procedures Guide: Master/Pilot exchange

A1 SHIP-TO-SHORE: MASTER/PILOT EXCHANGE

SHIP IDENTITY

Name | Call sign | Flag

Ship's agent | Year built | IMO No

Cargo type | Ship type | Last port

ADDITIONAL COMMUNICATION INFORMATION

Fax | Telex | Other

PILOT BOARDING

Date/ETA (UTC/LT) | Freeboard

Boarding station (if there is more than one)

SHIP PARTICULARS

Draught fwd | Draught aft | Draught amidships (salt water)

Air draught | Length | Beam

Displacement | Dwt | Gross | Net

ANCHORS

Port anchor | Stbd anchor (length of cable available)

MANOEUVRING DETAILS AT CURRENT CONDITION

Full speed | Half speed

Slow speed | Min. steering speed

Propeller direction of turn: left / right | Controllable pitch: yes / no

Number of propellers | Number of fwd thrusters | Number of aft thrusters

MAIN ENGINE DETAILS

Type of engine: motor / turbine / other

Max. number of engine starts | Time from full ahead to full astern

EQUIPMENT DEFECTS RELEVANT TO SAFE NAVIGATION

OTHER IMPORTANT DETAILS e.g. berthing restrictions, manoeuvring peculiarities

Annex D

Accident investigation report - JS North-Western Shipping Company

PUBLIC JOINT-STOCK COMPANY

"NORTH-WESTERN SHIPPING COMPANY"

(PLC "SZP")

ORDER

19.11.2012 No 197

Saint Petersburg

Collision of M/S "Aleksander Tvardovskiy" with M/S "UKD Bluefin" in the port of Immingham on 01.08.2012

On 01.08.2012 at 16:15 M/S "Aleksander Tvardovskiy" Plc "SZP" commanded by Captain [redacted] completed the discharge of the vessel in the port of Immingham (England) and was ready for departure according to the checklist No 4 of SUB including check-up of the GD reduction-gear launch ahead and astern under manual operating mode with the aid of the telegraph.

At 16:30 M/S "Aleksander Tvardovskiy" commanded by [redacted], with the pilot on board, started mooring manoeuvres. To increase safety of manoeuvring in constraint conditions, the Captain decided the propulsion engines of the vessel to be put under manual operating mode with the aid of the telegraph. At 16:35, following the instructions of the pilot, the Captain turned the telegraph handle onto Dead Slow Astern position to obtain sufficient space around the head of the vessel for another manoeuvre while calling at the lock. At 16:38 the telegraph was turned onto the "Stop" position when the vessel had speed of about 1.5 knots astern. At 16:42 the telegraph was turned onto Dead Slow Ahead position to reduce astern inertia of the vessel. At 16:44 the Captain turned the telegraph onto STOP while the vessel had speed of about 1 knot astern. At 16:48 the Captain turned the telegraph onto Slow Ahead and at that point the report was received from the stern that the distance between M/S "UKD Bluefin" and the stern was 40 m and kept decreasing, therefore the telegraph was immediately turned onto Full Astern and then onto Full Ahead position because the vessel was still moving astern. At 16:50, the Captain noticed that the speed of the vessel increased rather that decreased, and discovered that the reduction gear was actually working Full Astern not Full Ahead so he turned the telegraph onto "STOP" and literally at that point the right aft end of the vessel crashed into the starboard of M/S "UKD Bluefin". As a result of the collision M/S "Aleksander Tvardovskiy" sustained damage of a total area of 6 m^2 to the right aft end. M/S "UKD Bluefin" also sustained damage of a 2m long scission to her starboard.

M/S "Aleksander Tvardovskiy" was forwarded to the GL Register Inspector, who recommended the minimal repair that would allow the vessel to reach safely the port of Kaliningrad, where the vessel was to be fully repaired. On completion of temporary repairs, the Inspector granted the vessel a permit, valid only for this one occasion, to go to the port of Kaliningrad.

The aforementioned incident was investigated by the North-Western State Department of River and Sea Control and categorised as an accident at sea.

<u>The aforementioned accident was caused by the following:</u>

- the human factor that was manifested by incorrect actions performed by the Chief Mechanic of the vessel while operating aster reduction-gear under manual mode and the breach of general methods and means of operating the vessel in restricted port waters by the Captain of M/S Aleksander Tvardovskiy.

Further to the above, I hereby ORDER:

1. **To reprimand** the Captain of M/S "Aleksander Tvardovskiy" [redacted] for improper performance of his job duties manifested in breach of Art.61 of the Merchant Shipping Code of the Russian Federation and Art.41 of Regulation on Service on the Ships of the Ministry of the River Fleet of RSFSR in part related to taking measures to ensure the safety of the vessel's navigation in restricted waters according to Art.192 of the Labour Code.
   Basis: Report of accident submitted by the Captain of M/S "Aleksander Tvardovskiy" [redacted] on 03 August 2012.
   Results of the investigation of the accident at sea conducted by the North-Western State Department of River and Sea Control of 14 September 2012 (Plc SZP Entry No 01-5580 of 26.10.2012)
2. To give **a warning** to the Chief Mechanic of M/S "Aleksander Tvardovskiy" [redacted] for improper performance of his job duties manifested in breach of Art. 139 (01)(03)(17) of the Regulation on Service on the Ships of the Ministry of the River Fleet of RSFSR in part related to taking measures to ensure the safe operation of aster reduction-gear under manual mode upon mooring according to Art.192 of Labour Code.
   Basis: Explanatory note of 01 August 2012 submitted by the Chief Mechanic of M/S "Aleksander Tvardovskiy" [redacted]
3. Technical Director of Plc "SZP" [redacted]
   - Technical managerial staff shall give special attention to the instructions regarding technical specifications of the GD steering system that shall be given to technical personnel nominated to certain ships.
4. Personnel Director of Plc "SZP" [redacted]
   - Chief mechanics with no experience or traineeship shall not be nominated to certain ships.
5. Department of Co-operation with Crews shall provide the Captain of M/S "Aleksander Tvardovskiy" [redacted] and Chief Mechanic of M/S "Aleksander Tvardovskiy" [redacted] with the order upon signature.
6. Department of Ship Safety of Plc "SZP" shall multiply the order and send copies to all vessels.
7. Department of Ship Safety of Plc "SZP" shall instruct all pilots prior to their arrival on board.
8. Captains of vessels shall discuss the order with their managerial staff.

Managing Director - [redacted] - (-) *signed illegibly*

Annex E

Accident investigation report - Russian North-Western State Department of River and Sea Control

"Approved"
Deputy Manager of North-Western Shipping Company
[redacted] (-) *signed illegibly*
14 September 2012

Place of investigation:
Investigators:
[redacted]

Received: No 01-5580
26.10.2012

DECISION No KLO-08/2012
INVESTIGATION OF ACCIDENT AT SEA
(name)

Type of accident: Damage to the vessel
(collision, stranding, structure damage, pollution etc)

Date and time of accident: 01.08.2012 16:50:00.0
(day, month, year, hours, minutes)

Place of accident: Port of Immingham (England)
(port, channel, strait, sea, ocean, coordinates)

Details of the vessel:

Name: Aleksander Tvardovskiy

Flag: Russia

IMO No: 9057290

Course (from-to): Immingham - Sunderland

Name of the captain: [redacted]

Port (place) of registry
and number of registry: Saint Petersburg, 9057290

Owner, IMO No, address: JS"North-Western Shipping Company" 555638
190000, St. Petersburg, ul. Bolshaia Moskva 37

Built (Place/year) : Volgograd, 1995

Largest dimentions: 89.5m x 13.4m x 5.7m

Capacity (gross, net): 2319/1034

Type and capacity of ship propulsion:	SKL/2448
Number and structure of propellers:	1/NOZZEL
Steering link structure, PU:	PU-125 kwt
Full speed (manoeuvre/sea in knots):	11 knots
Draft at the moment of accident (forward):	1.80m
Draft at the moment of accident (aft):	3.20m
Number of passengers:	0
Type and amount of cargo, placement in holds:	In ballast
Crew members:	0
Crew life-saving equipment:	Rafts PSN-10, lifeboat for 6 persons, 14 life jackets
Radio station power and radius:	Transmitter T-2130, RT - 2047 Inch, ES Smartfind , UAIS T-10, STV-160, IC-GM 1600E, Satellite link
Electro-radio-navigation equipment:	2 Bridge masters
Number and capacity of dewatering devices:	1 Fire drain pump NCV1 80/65, 2 ballast drain pumps 60/35
Fire safety equipment:	Stationary foam extinguisher - 136 litres, CO_2 extinguisher, 1 emergency fire pump 25/30, 1 fire pump 60/35

Ship ice strengthening category:

Details of inspections undertaken by ship classification societies:

Society (societies) issuing classification and convention documents and undertaking final inspection of the ship and shipping company: German Lloyd

Validity of the seaworthiness certificate:

Validity of ship classification certificate: until 10.07.2015

List of ship documents issued according to international agreements of the Russian Federation and their period of validity:

Load Line Certificate - 10.07.2015
Safety Construction Certificate - 10.07.2012
Safety Equipment Certificate - 10.07.2012
Radio Certificate - 10.07.2012
IOPP Certificate - 10.07.2012

Details of Accident at Sea

On 01.08.2012 the discharge of the vessel was completed in the port of Immingham and at

16:15 she was ready for departure according to the checklist No 4 including check-up of the GD reduction-gear launch ahead and astern under manual operating mode with the aid of the telegraph.
On 01.08.2012 at 16:30 M/S "Aleksander Tvardovskiy" commanded by [redacted] with the pilot on board, started mooring manoeuvres after the discharge in the port of Immingham (England). To increase safety of manoeuvring the propulsion engines of the vessel were put under manual operating mode with the aid of the telegraph and the blockage of GD was unlocked. At 16:35, following the instructions of the pilot, the Captain turned the telegraph handle onto Dead Slow Astern position to obtain sufficient space around the head of the vessel for another manoeuvre while calling at the lock. At 16:38 the telegraph was turned onto the "Stop" position when the vessel had speed of about 1.5 knots astern. At 16:42 the telegraph was turned onto Dead Slow Ahead position to reduce astern inertia of the vessel. At 16:44 the Captain turned the telegraph onto STOP while the vessel had speed of about 1 knot astern. At 16:48 the Captain turned the telegraph onto Slow Ahead and at that point the report was received from the stern that the distance between the vessel and the stern was 40 m and kept decreasing while the vessel kept moving astern with the speed of 0.9 knots. At 16:49 the telegraph was immediately turned onto Full Astern and then onto Full Ahead position because the vessel was still moving astern so the Chief Executive Officer repeated the command "All Speed Ahead" into the engine room via intercom. At 16:50, the Captain noticed that the speed of the vessel increased rather that decreased, and discovered that the reduction gear was actually working Full Astern so he turned the telegraph onto "STOP" and literally at that point the right aft end of the vessel crashed into the starboard of M/S "UKD Bluefin". As a result of the collision M/S "Aleksander Tvardovskiy" sustained damage of the total area of 6 m^2 to the right aft end. M/S "UKD Bluefin" also sustained damage of about a 2m long scission to her starboard.

Enclosures: Accident report, accident statement, classification certificate, register report, register documentation, interview records, extract from the court register, extract from the machine book, photographs

The consequences of the accident:
Loss of life: None

Loss of cargo: None

Loss of vessel: None
Damages (hull, mechanisms, systems, devices, equipment, cargo etc) M/S "Aleksander Tvardovskiy" sustained damage of the total area of 6 m^2 to the right aft end. M/S "UKD Bluefin" also sustained damage of about a 2m long scission to her starboard.

Pollution of the environment: None
Damage to marine infrastructure facilities: None

Findings of the Accident at Sea Investigation Body:
Circumstances of the accident:
South-East wind force of 2-3, no current. There were the Captain, Chief Executive Officer and a pilot present on the navigating bridge. All devices and mechanisms worked under normal mode. Anchor and helm devices in good working order. The vessel ballasted.
Established facts:
On 01.08.2012 on departure from the moorage in the port Immingham M/S "Aleksander

Tvardovskij crashed into M/S "UKD BLUEFIN". As a result of the collision M/S "Aleksander Tvardovskiy" sustained damage of the total area of 6 m^2 to the right aft end. M/S "UKD Bluefin" also sustained damage of about a 2m long scission to her starboard.

The cause of the accident:
The accident was caused by the human factor that was manifested by incorrect actions performed by the Chief Mechanic of the vessel while operating aster reduction-gear under manual mode and the breach of general methods and means of operating the vessel in restricted port waters by the Captain of M/S "Aleksander Tvardovskiy".

Persons involved in accident:

[redacted]	Captain of M/S "Aleksander Tvardovskiy"
[redacted]	Chief Mechanic of M/S "Aleksander Tvardovskiy"

Conclusion and determination of persons involved in accident:
Chief Mechanic [redacted]id not ensure the safe operation of aster reduction-gear upon mooring.
Captain [redacted]id not ensure the safe operation of mooring in restricted waters.

Recommendations to prevent similar accidents in future:
Mooring activities are the most responsible and accident prone particularly in restricted waters of ports. To avoid accidents under such circumstances the technical condition of the vessel must meet all required standards. In case of any doubts regarding the safety of the manoeuvre, tugboats must be used.

Date of approval of the documents for investigation: 03.09.2012 09:28:44.0
Date of completion of the investigation: 11.09.2012 13:00

[redacted] (-) *signed illegibly*

Annex F

Humber Estuary Services Master - Record of Pilot Exchange

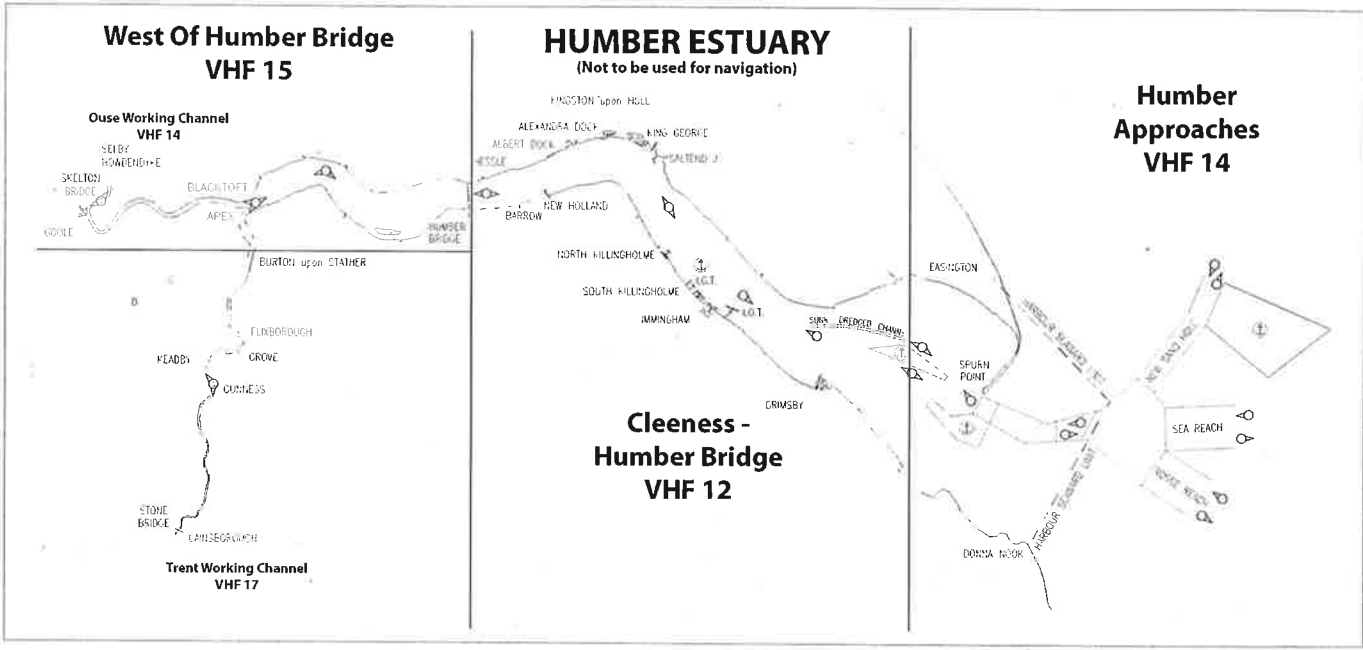
Record Of
Master - Pilot Exchange

www.humber.com

Ver 1.0 (2012)

Vessel Name | Date | Pilots Name

This plan aims to develop a standard exchange of information practice as per the recommendation of IMO Resolution A.960, Annex 2, Section 5 (Procedures for Maritime Pilots). It should supplement and assist, not substitute for, the verbal information exchange. This information exchange should be a continuous process that generally continues for the duration of the passage. Masters are reminded the presence of a pilot does not relieve them of their responsibilities and of their obligation to monitor the vessels position throughout.



VHF CHANNEL FOR TERMINAL/BERTH/DOCK

IS THE VESSEL CARRYING HAZARDOUS CARGO? YES/NO

PILOT/MASTER EXCHANGE

From ______ To ______ ETA Destination ______ Side To ______

HW/LW Time ______ Place ______ Min Calculated UKC ______ m In Position ______

Route: **Hull/Skitter** → OUT → **Main/FHC** — **Main/SDC/GY Middle** — **Inbound TSS Lane / Outbound TSS Lane** ← IN ← **NSH/SR/RR**

TUGS

No.	Name	Type	BP (Tonnes)	Rv Position & Time
1				
2				
3				
4				

EXCHANGE CHECKLIST

EXCHANGE CHECKLIST	✓
Any Defects Confirmed & Reported To VTS	
Pilot/Ship Passage Plans Sighted & Discussed	
Charts Available For Entire Passage	
Vessel Pilot Card Sighted	
Suitable Helmsman Available As Required	
Anchors Cleared And Ready	
Engine, Helm & Control Systems Checked	
Berthing & Mooring Arrangements Discussed	
Ship Handling Characteristics & Limitations	
Weather & Tidal Strength/Direction	
Actions In The Event Of Restricted Visibility	
Relevant Local Regulations Discussed	
Contingency & Abort Procedures Discussed	
Pilot Ladder Arrangements (Outbound)	

VESSEL DEFECTS (write none if none reported)

MASTER/PILOT DECLARATION

We certify the Pilot and Master have discussed all aspects of the passage as indicated, answering any questions either party may have. We have identified who will be responsible for the navigational conduct of the vessel at each stage of pilotage and who will be responsible for operating the navigational controls.

Pilot's Signature ______ Master's Name ______ Master's Signature ______

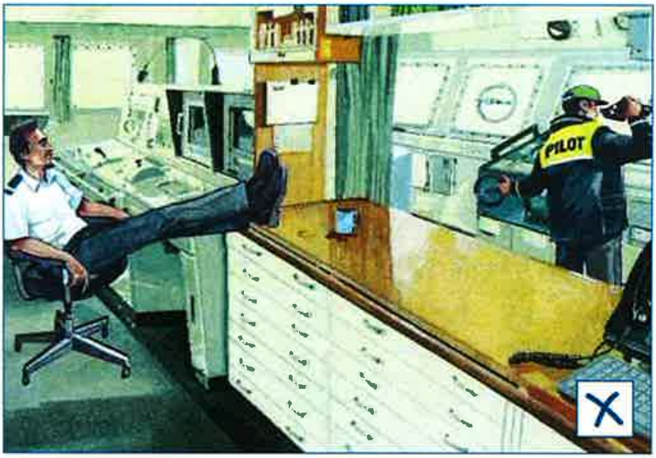
NORTH

POSTER EIGHT
www.nepia.com

SAFE WORK

Loss prevention poster series for North of England Members

BRIDGE TEAM/PILOT RELATIONSHIP



Safe work is North of England's loss prevention initiative to promote good practice and safe systems of work on board ship.

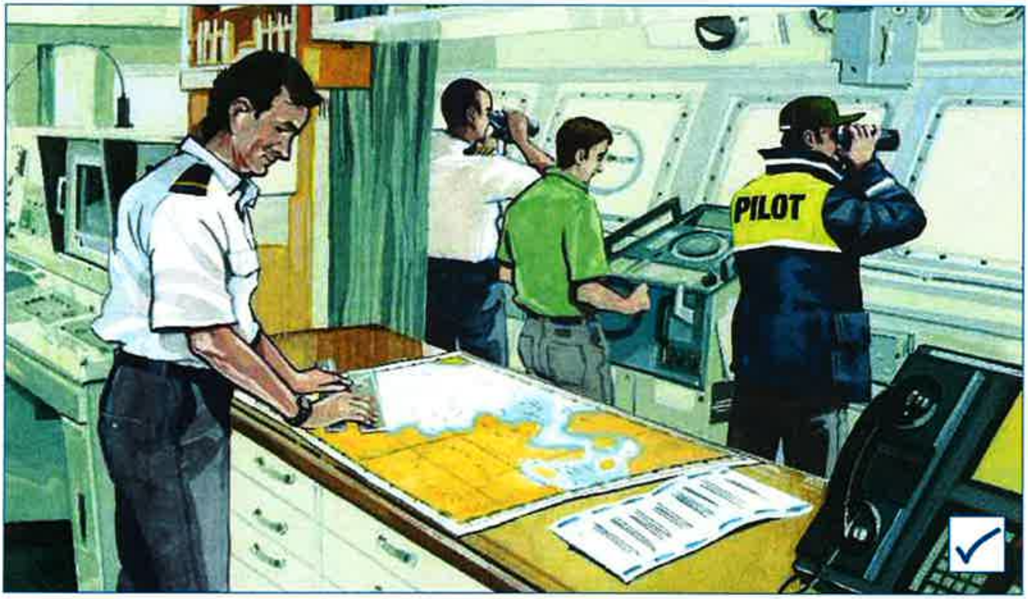
Safe work means that watchkeepers should be competent and properly trained for the tasks to be performed.

Safe work requires that the ship's officers and pilot adopt proper bridge team management procedures.

Safe work requires the pilot and ship's officers use a common voyage plan, updated and amended following discussion, and monitored throughout.

Safe work requires excellent communication and the integration of the pilot into the bridge team.

Safe work practices will reduce the number of incidents and accidents.



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Marine Accident Report

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