Report on the investigation of

# *Lord Nelson*

contact with Tower Bridge London

River Thames

15 May 2004

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**Extract from**

**The Merchant Shipping**

**(Accident Reporting and Investigation)**

**Regulations 1999 – Regulation 4:**

The fundamental purpose of investigating an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 1999 is to determine its circumstances and the causes with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

**NOTE**

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

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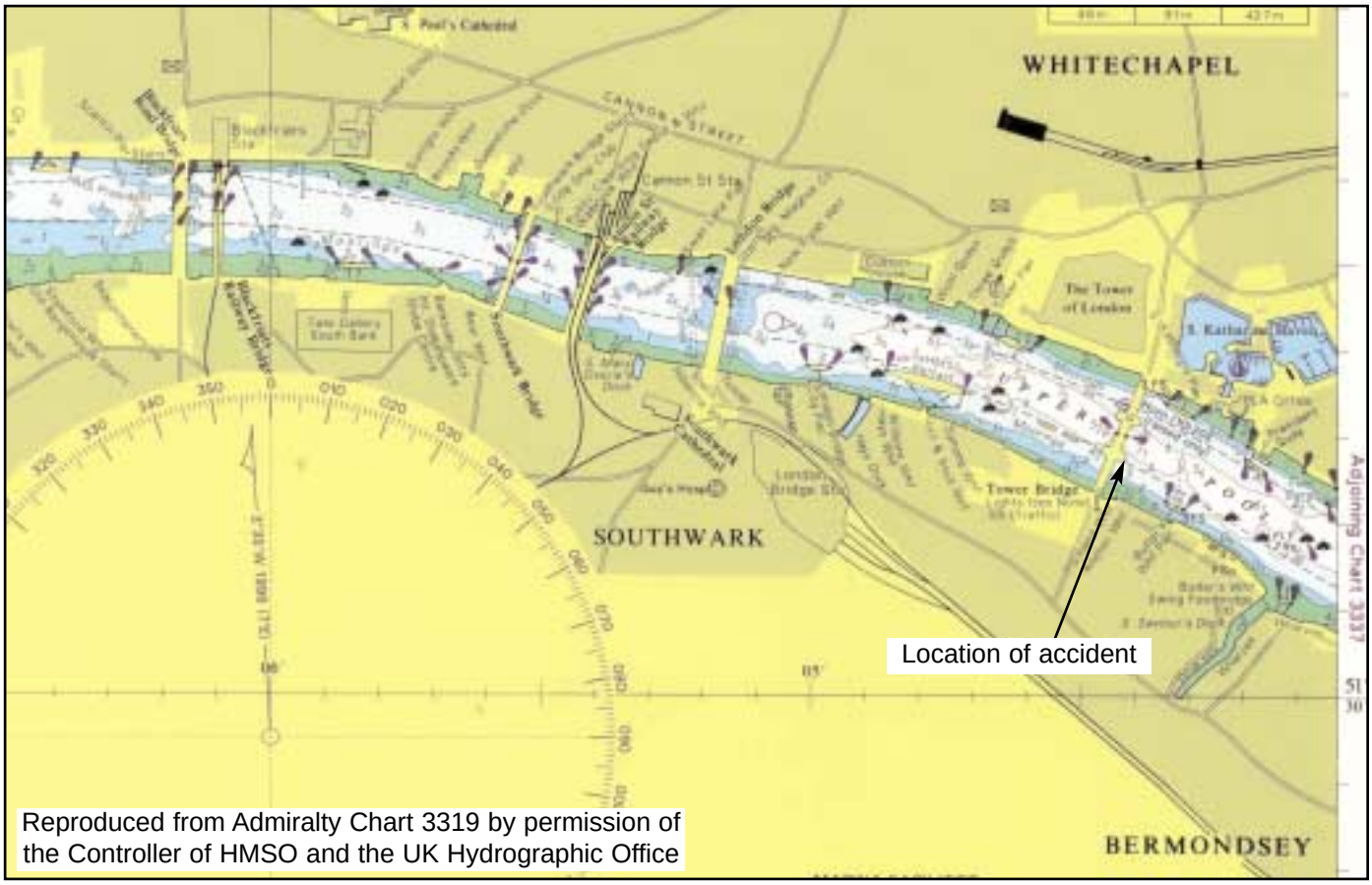
## GLOSSARY OF ABBREVIATIONS AND ACRONYMS

| | | |
|---|---|---|
| bhp | - | brake horse power |
| cable | - | one tenth of a nautical mile |
| ETA | - | Estimated Time of Arrival |
| gt | - | gross tons |
| ISM | - | International Safety Management (Code) |
| m | - | metre |
| PLA | - | Port of London Authority |
| RIB | - | Rigid Inflatable Boat |
| RNLI | - | Royal National Lifeboat Institution |
| SMS | - | Safety Management System |
| UK | - | United Kingdom |
| VHF | - | Very High Frequency |



## SYNOPSIS

At 1007, on 15 May 2004, the sail training vessel *Lord Nelson,* owned and managed by the Jubilee Sailing Trust, made heavy contact with London's Tower Bridge. The MAIB was notified, and an investigation began that day.

*Lord Nelson* was on passage up the River Thames, and was intending to pass under Tower Bridge and then turn around and pass under the bridge again, before berthing at West India Dock, as part of a public relations exercise. Included in her crew were 17 disabled persons.

Earlier that morning, she had picked up a pilot at Gravesend for the passage. The pilot had been issued with a Pilotage Service Order by the administration department of Port of London Authority (PLA) pilots, which showed the times of Tower Bridge lifts at 1000 and 1030 respectively. During the pilot/master exchange which followed, no discussion took place concerning the arrangements of the bridge lifts. The pilot was under the assumption that they had been booked by the master or by the Jubilee Sailing Trust in accordance with published procedures. By contrast, the master believed the PLA pilots had made the arrangements. In fact, no bookings had been made.

Twenty minutes before *Lord Nelson*'s ETA at Tower Bridge, the pilot made several attempts to contact the bridge control room by VHF radio, but received no reply. A short time later, he responded to a weak VHF radio transmission, which he believed to be from Tower Bridge. Now under the impression that the bridge control room was manned, the pilot continued the passage. Further attempts were made to contact the bridge, again without success. A request was also made to Woolwich Radio for them to make contact, who informed them a short time later, when *Lord Nelson* was a distance of 2-3 cables from the bridge, that a bridge lift had not been arranged.

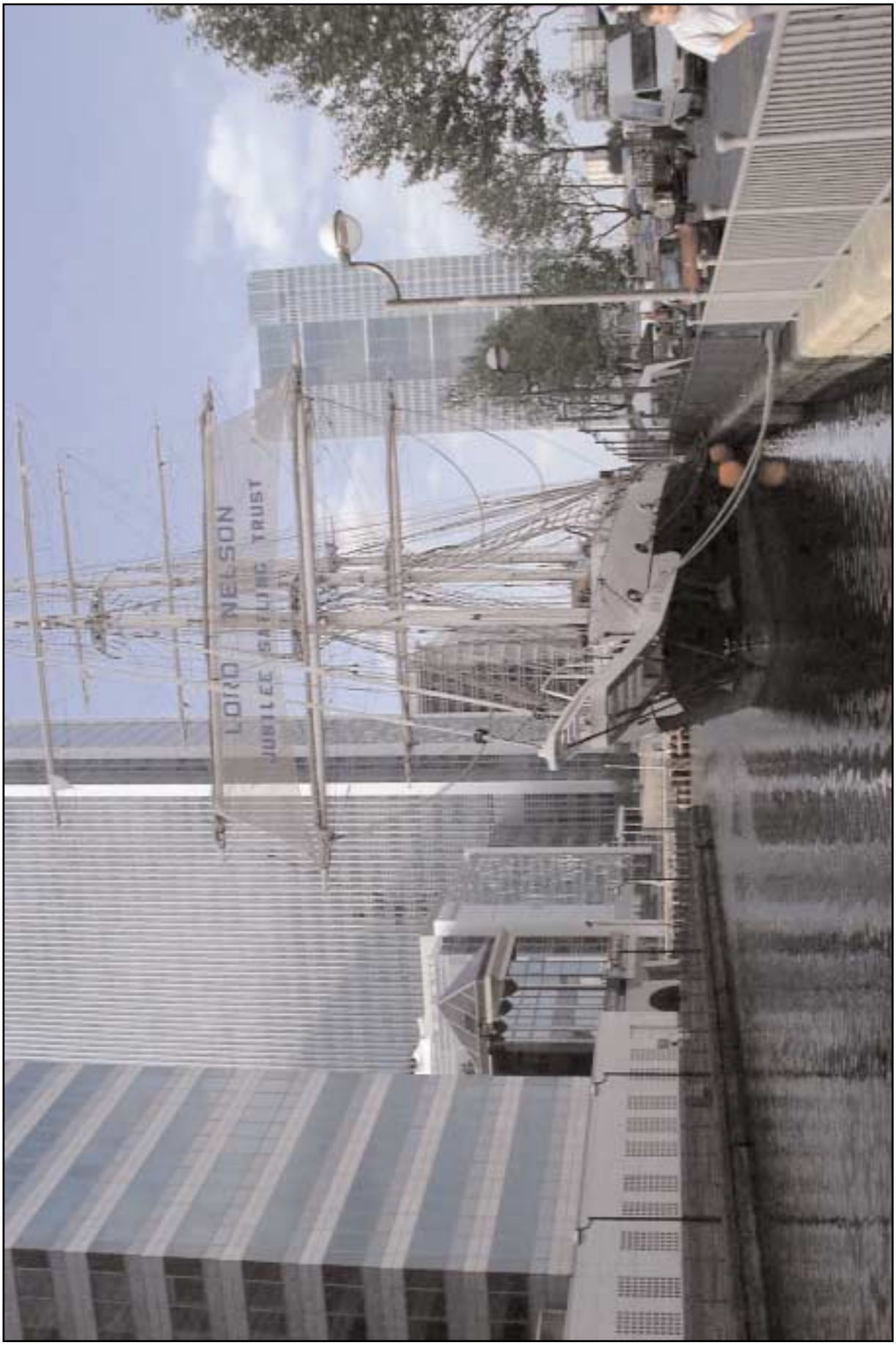
A decision was then made to abort the bridge transit. However, despite several engine manoeuvres, and assistance from a PLA launch, they failed to prevent *Lord Nelson* from being set towards Tower Bridge by the flood tide, and she eventually made heavy contact with its southern buttress. As a result of the accident, *Lord Nelson* sustained damage to her port side. Fortunately, there were no injuries.

Several factors contributed to the accident including:

- The raising of Tower Bridge not being booked in accordance with published procedures.
- No contingency plan having been put in place for the bridge transit.
- The starboard anchor was not used to prevent the vessel coming into contact with Tower Bridge.
- PLA staff not confirming, in advance, the expected bridge lifts.
- No regulated requirement for early and clear communications between pilots/masters and Tower Bridge control room staff.
- Responsibility/procedure for bridge/lock transits not being clearly identified in the Jubilee Sailing Trust's company procedures.

Recommendations have been made to The Port of London Authority and the Jubilee Sailing Trust.

Figure 1




*Lord Nelson*

# SECTION 1 - FACTUAL INFORMATION

## 1.1 PARTICULARS *LORD NELSON* AND ACCIDENT

**Vessel details**

| | | |
|---|---|---|
| Registered owner | : | The Jubilee Sailing Trust Southampton |
| Manager(s) | : | The Jubilee Sailing Trust Southampton |
| Port of registry | : | Southampton |
| Flag | : | UK |
| Type | : | Sail Training Vessel |
| Built | : | 1985. James Cook, Essex |
| Classification society | : | Lloyd's Register |
| Construction | : | Steel |
| Length overall | : | 54.7m |
| Gross tonnage | : | 368 |
| Engine power | : | 2 x 260 bhp Mitsubishi diesels |
| Service speed | : | 8 knots |

**Accident details**

| | | |
|---|---|---|
| Time and date | : | 1007 on 15 May 2004 |
| Location of accident | : | Tower Bridge – River Thames, London |
| Persons on board | : | 50 |
| Injuries/fatalities | : | None |
| Damage | : | Port side frame, deck and shell plating |

## 1.2 BACKGROUND

### 1.2.1 The Jubilee Sailing Trust

The Jubilee Sailing Trust is a charitable organisation based in Southampton, and was set up to provide adventure sailing holidays for both able-bodied and physically disabled people. The objective of the Trust is the integration of able-bodied and physically disabled people. This is achieved using the very real challenge of crewing a tall ship at sea.

The trust is a unique charity in that it owns two specially designed tall ships, *Lord Nelson* **(Figure 1)** and *Tenacious*, both square rigged barques. The ships are purpose-built to enable physically disabled and able-bodied people to work and live alongside one another onboard. No-one onboard is a passenger, everyone works to his or her best ability. The ships spend the winter months island-hopping in the Canaries, and then return to the UK in the spring for voyages around the UK and Northern Europe.

### 1.2.2 Tower Bridge

Tower Bridge **(Figure 2)** has stood over the River Thames in London since 1894, and is one of the most recognisable bridges in the World.

When it was built, Tower Bridge was the largest and most sophisticated bascule bridge of its time. It was a hydraulically-operated bridge, using steam to power the pumping engines. The bascules are still operated by hydraulic power, but since 1976, oil and electricity - rather than steam - have driven them.

The bascules **(Figure 3)** are capable of being lifted to a maximum angle of 86° which can be completed in approximately 1 minute. On average, the bascules are lifted 800-1000 times per annum.

Any vessel exceeding a certain height is entitled to a bridge lift, and there is no charge. Bridge lifting operations are carried out 24 hours per day, 365 days per year.

Tower Bridge is owned, funded and managed by the Corporation of London.

Figure 2

Tower Bridge

Figure 3

The bascules

### 1.2.3 The PLA

As a statutory harbour authority, the PLA is responsible for the management of navigational safety on the tidal Thames between Teddington and the outer port limits. The PLA is also a competent harbour authority within the provisions of the Pilotage Act 1987.

The PLA provides conservancy and vessel traffic services for ships and craft using the port, including the maintenance of navigational channels, moorings, lights and buoys, and the provision of hydrographic, tidal and other information. The PLA is also the pilotage authority for the tidal Thames.

Other responsibilities include registration of craft, and the licensing of watermen and lightermen, and of river works extending into, over, or under the Thames below mean high water level.

## 1.3 DESCRIPTION OF *LORD NELSON*

*Lord Nelson* is a three masted square-rigged sailing barque with two decks above the waterline: the weather deck and accommodation deck. There is an open bridge on the weather deck. The stores, pump and engine rooms are situated below the accommodation deck.

## 1.4 THE MAIN ENGINES

*Lord Nelson* is equipped with two 260bhp Mitsubishi diesel main engines. Each drives a fixed pitch, outward turning propeller.

As a result of a survey carried out on 10 May 2004, in Southampton, Lloyd's Register issued an Interim Class Certificate. This was delivered to the master of *Lord Nelson* during the afternoon of 15 May 2004. The certificate stated that a survey had been held, and identified damage to the port main engine.

A Condition of Class was imposed as follows:

- *Port main engine to be specially examined and dealt with. In mean time to be used in emergency only.*

The damage to the port main engine had been caused by the loss of cooling water when a high temperature sensor had failed to activate and the engine had become severely overheated.

During the survey, the engine was not dismantled to identify the nature of the damage, but tests carried out showed that two cylinders had low compression pressures. The owner's engineering staff concluded that these units had suffered from broken piston ring(s).

Discussions about the use of the port main engine, which were not documented, were held between the master and the owner's engineering staff. Following these discussions, the master was under the impression that if the port main engine was used, the power should be limited to 50%.

## 1.5 THE CREW

*Lord Nelson* had a complement of 48 crew. There were eight regular marine crew, including the master and three watchkeeping officers. Included in the total complement were 17 physically disabled persons - each accompanied by an able-bodied buddy.

The master was the holder of a UK unrestricted Master's Certificate of Competency. He had been in the employment of the Jubilee Sailing Trust for the previous 5 years, and had joined *Lord Nelson* on this tour of duty on 17 April 2004.

Prior to this, he had been employed by P&O general cargo division, P&O ferries and the Sail Training Association.

The master had passed through Tower Bridge several times before. His last transit as master was in 1996 with the Sail Training Association. On that occasion, the raising of Tower Bridge had been arranged by the Sail Training Association.

## 1.6 THE PILOT

The pilot was an experienced River Thames pilot. He held a UK unrestricted Master's Certificate of Competency, and had been employed by the PLA since 1996.

After joining the PLA, he trained and worked as a sea pilot before becoming a river pilot in 2001. Since then he had piloted numerous vessels without incident, including the *Lord Nelson,* many of which had involved passing through Tower Bridge.

## 1.7 ENVIRONMENTAL CONDITIONS

At the time of the accident, there was a variable wind of force 2 and no river swell. The visibility was very good.

The tidal stream was flooding at a rate of 2.5 knots and the time of the next high water, at London Bridge, was 1213.

## 1.8 TOWER BRIDGE LIFTING PROCEDURE/OPERATION

### 1.8.1 Booking procedure

It is a requirement of the Corporation of London, that requests for the raising of Tower Bridge bascules, referred to as 'lifts', are made in writing directly to the bridge operators. Requests have to be made at least 24 hours in advance of a lift, with 1 week's notice, or longer, being preferred.

Requests should be made by the vessel's agent, owner or master. When vessels are accompanied by tugs, the tug operator is required to make additional bookings for each tug.

Once a written request for a bridge lift has been received, it is approved and signed by the bridge operations manager. Written confirmation of the booking is then sent back to the originator.

Each approved booking is then added to the booking list, and circulated weekly by facsimile/e-mail to the following recipients:

a) PLA
b) Emergency services
c) Capital radio
d) Other news and media
e) Miscellaneous agencies and individuals
f) Tower Bridge lift information telephone line.

The requirements for booking a bridge lift are promulgated in the Dover Strait Pilot, PLA byelaws and an Information Note produced by PLA specifically for masters, owners and pilots.

### 1.8.2 Bridge operation

The bridge control rooms are manned 20-30 minutes before the time of a booked lift. When the control room is manned, a listening watch is maintained on Channel 14 VHF radio. Masters and pilots are advised to confirm their ETA with the bridge control room once this is manned. There is, however, anecdotal evidence to suggest that communications between bridge control room operators and masters/pilots are minimal.

The control room operator will lift the bridge to a nominal height, dependent on the type and size of vessel requiring passage. This is done to keep the raising and lowering times to a minimum. A full bridge lift normally takes 6.5 minutes from stopping road traffic and pedestrians until resuming again. Between 0700 and 1900, the operation is carried out by staff already on site. During other times, staff have to be called in from other locations.

Should an emergency lift be required between 0700 and 1900, it will normally take at least 10 minutes before bridge staff are in a position to start lifting operations. This is because the staff are normally working at various locations around the Tower Bridge site, away from the control room. Outside of these hours, staff are on a minimum 30 minute call out to respond to any emergency bridge lift requests.

There are six trained bridge control room operators, none of whom have any marine background.

## 1.9 PLA - RIVER PILOTAGE ARRANGEMENTS

River pilots must be booked in advance, in writing, by vessel agents, masters or by the shipping company involved. PLA pilots are not involved in the booking process for Tower Bridge lifts.

PLA pilots, port services (eg tugs and linesmen) and, where appropriate, a bridge lift, are all booked by a vessel's agent, master or shipping company. Details, including the arrangements for the bridge lift, are then passed to the PLA by e-mail, facsimile or telephone. Appropriate details are subsequently reflected on the Pilotage Service Order (A Form), which is given to the assigned pilot before boarding the vessel.

PLA pilots have no system in place for confirming that a bridge lift has been booked.

## 1.10 BACKGROUND TO THE VOYAGE

*Lord Nelson* sailed from her home port of Southampton on 10 May 2004, and proceeded to the Isle of Wight and Fecamp, France.

On the evening of 14 May, *Lord Nelson* anchored off Margate in preparation for the River Thames transit the following day.

It was the intention of the Jubilee Sailing Trust, as part of a public relations exercise, for *Lord Nelson* to pass under Tower Bridge, then turn round to head downstream before passing under Tower Bridge again and proceeding to her berth at West India Dock. The voyage had been arranged for some time.

The Jubilee Sailing Trust had contacted PLA pilots on 6 May, and had requested pilotage for the River Thames passage, to arrive in West India Dock at 1200 on 15 May. No mention was made of Tower Bridge lifts.

In the period that followed, leading up to 14 May, *Lord Nelson*'s master spoke to PLA pilots on three occasions to discuss the passage, the pilot boarding time and location, and any constraints that might be placed on the river transit due to the port main engine being out of service. He also informed them, that even in an emergency, the port main engine could only be used at 50% power.

During these discussions, the times of 1000 and 1030 for the Tower Bridge lifts were agreed upon. PLA pilots assumed the master, or the Jubilee Sailing Trust, would arrange the bridge lifts directly with Tower Bridge in accordance with published procedures. Conversely, the master assumed PLA pilots would do so. It was also agreed that the pilot would board at 0630 at Gravesend.

## 1.11 NARRATIVE OF EVENTS

At approximately 0400, 15 May 2004, *Lord Nelson* departed from the anchorage. At 0630, the duty pilot boarded her at Gravesend. He had been issued with a Pilotage Service Order ('A' form), which had been completed by the administration department of the PLA pilots. In addition to vessel particulars and destination, it showed the time of Tower Bridge lifts and the opening time of the lock gates at West India Dock. It also stated that the port main engine was out of service. Also taking passage, by private invitation, was an ex-master of the vessel who coincidentally was an off-duty PLA Sea Pilot.

Once on board, the pilot was given the pilot card, and the passage plan was discussed with the master. Discussions included the time of arrival at the Thames Barrier and Tower Bridge, and the restriction on the port main engine, even though the pilot did not intend to use the port engine because he planned to swing the vessel on her starboard anchor to return back through the bridge.

*Lord Nelson* continued on passage up the River Thames at a speed of approximately 5.5 knots on the flood tide. During the passage, the starboard anchor was made ready for use in the Upper Pool after transiting Tower Bridge.

At 0940, *Lord Nelson* passed Limehouse, which is 2 miles from Tower Bridge. On the bridge were the master, chief officer, helmsman, and on-duty and off-duty pilots. At 0942, in the vicinity of Surrey Docks, the pilot reported into Woolwich Radio in accordance with normal reporting procedures. He also attempted to make contact with Tower Bridge, but received no reply. Speed was then reduced to dead slow on the flood tide.

From 0942 until 0947, the pilot made six further attempts to contact Tower Bridge, without success. He then called Woolwich Radio, who agreed to contact Tower Bridge by landline. Then, at 0948, the pilot responded to a weak VHF transmission, believing it to be Tower Bridge: *"Yeah we're just rounding Wapping, now we have you in sight, can you lift the bridge please?"* Now under the impression that the control room was manned, the pilot continued the passage, reducing speed to steerage way only.

However, the control room was not manned, and the only hand-held VHF radio held by Tower Bridge was not in use.

From 0953 until 0956, the pilot made two further attempts to contact Tower Bridge, again without success. The distance to Tower Bridge was now approximately 5 cables. He then remarked to the master that poor contact with the Tower Bridge control room, and late bridge lifting, was not unusual.

Between 0956 and 0958, the pilot received a VHF radio call from *Merit,* a tug with a tow that was overtaking *Lord Nelson*. It was agreed that *Merit* should pass on *Lord Nelson's* starboard side.

At 0958, the off-duty Sea Pilot contacted Woolwich radio by mobile telephone to enquire if they had yet contacted Tower Bridge.

While manoeuvring using ahead and astern propulsion to control *Lord Nelson'*s approach, the flood tide began setting her broad side on to the stream. The distance from the bridge had reduced to approximately 2-3 cables.

At 1001, in reply to the off-duty Sea Pilot's earlier enquiry, Woolwich Radio contacted *Lord Nelson* and said that they had finally succeeded in contacting Tower Bridge. They stated, however, that a bridge lift had not been ordered. This meant that Tower Bridge control room was unmanned. Based on this information, the pilot and master decided to abort the bridge passage. Realising they were being set further towards the bridge, the pilot sought the assistance of *Westbourne,* a PLA river launch. By then, *Lord Nelson*'s stern was very close to a set of mooring buoys on the southern side of the channel, and *Merit* was in the process of passing.

At 1005, the port main engine was started, and the crew members who were working aloft in the rigging were called down.

After a series of engine manoeuvres, the pilot directed *Westbourne* to push on the port bow, in an attempt to get *Lord Nelson'*s head round to starboard. He considered they were too close to the bridge to use the starboard anchor and a hard to starboard manoeuvre, using helm and engines alone, would be hampered by the passing tug.

By this time, *Lord Nelson* was approximately 1 cable from the bridge.

Despite the attempt by *Westbourne*, and several more engine manoeuvres, at 1007, *Lord Nelson* was set against the southern buttress of Tower Bridge, making heavy contact on her port side amidships. After the contact, the master instructed all watertight doors to be closed, the crew to be mustered with lifejackets, and the vessel to be sounded round.

To prevent the tide from sweeping *Lord Nelson* under the bridge, her lateral position against the buttress was maintained using her main engines, and assistance from *Westbourne* and an RNLI RIB pushing against her port bow. In order to clear the buttress, the master and pilot agreed to use the services of the tug *Merit.*

At 1033, *Merit* made a line fast to *Lord Nelson'*s starboard bow, and towed her clear. At 1037, *Merit* was dismissed once *Lord Nelson'*s head was in mid-stream. She then made her own way to West India Dock, where she berthed, and an assessment of the damage was carried out.

## 1.12 SAFETY MANAGEMENT SYSTEMS

### 1.12.1 The Jubilee Sailing Trust

Although not a requirement for ships of less than 500gt, *Lord Nelson* had been issued with a Safety Management Certificate as part of the ISM Code with which the Jubilee Sailing Trust had voluntarily complied.

In accordance with the ISM Code, guidance and instructions to masters and crew had been issued in the form of Fleet Instructions. These state, under a section entitled “master’s responsibility” :

> *The vessel is always under the master’s full command and he is responsible for ensuring that the vessel is navigated safely at all times.*

Under a section entitled ‘passage planning’ they also state:

> *Having prepared the passage plan, the tactics to be used in the execution of the plan must be decided. The factors to be taken into account will include:*
>
> *a) The reliability and condition of the vessels’ navigational equipment*
> *b) Estimated times of arrival at critical points for tide heights and flow*
> *c) Meteorological conditions, particularly in areas known to be affected by frequent periods of restricted visibility.*
> *d) Day-time versus night-time passing of danger points, and any effect this may have on position fixing accuracy*
> *e) Traffic conditions, especially at navigation focus points.*
>
> *At this stage it is important for the master to consider whether any particular circumstance introduces an unacceptable hazard to the safe conduct of the passage.*

The fleet instructions make no specific reference as to who has responsibility for planning / arranging the opening of bridges and locks.

In addition to the Fleet Instructions, the Safety Management System incorporates checklist actions to be implemented during emergency situations, including collision/contact.

### 1.12.2 Port of London Authority

To comply with the requirements of the Port Marine Safety Code, the PLA undertook a comprehensive formal risk assessment with the assistance of consultants of activities within the port of London. The scope of the risk assessment embraced all of the PLA's navigation-related operational functions and company management infrastructure. It assessed risk in all navigational channels leading into London from the outer PLA limits in the Thames estuary to Teddington lock.

Each hazard identified by the assessment is ranked in order of risk (frequency x severity) and, depending on its ranking, is reviewed over a 4-year rolling period. Higher ranking risks are reviewed more frequently than the lower ones. For example, the top 6-8 ranked risks are reviewed on a 6-monthly basis. Contact with a bridge (Tower Bridge to Richmond) was ranked in order of risk as 182 out of 229.

In the risk assessment, the risks associated with transiting Tower Bridge were not considered separately, notwithstanding the additional constraints imposed by this operation.

# SECTION 2 - ANALYSIS

## 2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

## 2.2 FATIGUE

The master and pilot were well rested prior to the passage up the River Thames. The master had spent the previous night resting while the vessel was anchor, and the pilot had spent the previous night at home. Fatigue was not identified as a contributory factor in this accident.

## 2.3 EVENTS LEADING TO THE ACCIDENT

A major contributory factor of the accident was the failure to arrange the lifting of Tower Bridge in accordance with published and established procedures. Consequently, the bridge control room was not manned when *Lord Nelson* arrived off the bridge, as no bridge lift had been requested. None of Tower Bridge's personnel was aware that *Lord Nelson* would be transiting Tower Bridge. Had the bridge lift been arranged in the correct manner, the accident would have been avoided.

Procedures for the lifting of the bridge are adequately promulgated in the Dover Strait Pilot, PLA byelaws, a PLA Information Note for mariners, and on Tower Bridge's website. Nevertheless, *Lord Nelson* proceeded up the River Thames, from Gravesend, where the pilot boarded without any positive confirmation that the lifting of the bridge had actually been arranged. When the pilot boarded, he was under the assumption that the arrangements for lifting the bridge had been taken care of by the master or by the Jubilee Sailing Trust in accordance with published procedures. This assumption was confirmed by the details on the A Form, which he was given before boarding. By contrast, *Lord Nelson'*s master had assumed that the PLA pilots had made the arrangements.

It would have been a simple matter for the pilot to confirm with the master during the exchange of information which took place when he first boarded the vessel, that arrangements had been made. Had this been the case, both pilot and master would have been alerted to the fact that a bridge lift had not been arranged.

During the latter part of the passage, the pilot tried several times to contact Tower Bridge by VHF radio, without success, apart from a weak transmission some 6 minutes after his first call, which the pilot assumed to be from Tower Bridge. On this basis, he made his decision to commit *Lord Nelson* to the transit under Tower Bridge.

Not receiving a positive reply to his initial attempts to contact the bridge should have alerted both him, and the master, to the possibility that the control room was not manned. Preparations could then have been made for aborting the manoeuvre if it became necessary.

Further VHF radio calls to Tower Bridge received no reply. Only when Woolwich Radio informed the off-duty pilot that the bridge lift had not been arranged, did the master and pilot decide to abort the manoeuvre. By then, they were being set onto the bridge by the flood tide, and the time and sea room available to prevent the impending collision was very limited.

## 2.4 ACTION TAKEN

Prompt use of the starboard anchor, which was made ready, would probably have been the most effective way of preventing *Lord Nelson* from being set on to the bridge. It could have been used to turn the vessel around within a very short distance from the bridge and therefore, even if the anchor had not been let go until the time when Woolwich Radio confirmed there would be no bridge lift, its use would have prevented the collision with the bridge.

An emergency turn hard to starboard, using the main engines, would have always been difficult on a following tide, especially when both the master and pilot assumed that the port main engine had to be restricted to 50% of its power. Had maximum power been used on both engines, at an early enough stage, it might have been possible to turn the vessel and stem the tide and avoid collision with the bridge. In the latter stages, a hard to starboard manoeuvre would have been hampered by the passing tug *Merit,* which the pilot agreed to let pass before he became aware that the bridge lift had not been arranged.

## 2.5 CONTINGENCY PLANNING

Long before the master and pilot were informed that a bridge lift had not been arranged, action should have been taken to abort the transit. There should have been a contingency plan in place, which had previously been discussed and agreed between them.

The contingency plan should have been discussed and agreed between the master and the pilot. The plan should have established a point beyond which *Lord Nelson* would not proceed, unless positive confirmation had been received that the bridge was sufficiently open to permit safe transit.

The plan should also have included an assessment of the likely effects of factors such as the prevailing weather, likely traffic density and any limitations imposed by the port engine so that a safe abort point could be established, together with an agreed method of turning the vessel to head downriver in the event of an emergency.

## 2.6 USE OF THE PORT MAIN ENGINE

The Condition of Class, imposed on the vessel, restricted use of the main engine to emergencies only. The port main engine was used during the latter stages of this accident, shortly before impact with Tower Bridge. Clearly, this was an emergency, and the use of the engine was entirely proper.

However, in accordance with the master's understanding of the engine's condition, its use was limited to 50% of maximum power, so its effectiveness was significantly reduced.

The true status of the port main engine was that some piston ring damage was suspected, but this did not make the engine unusable. Damage of this type can be aggravated with engine use, and can result in a reduction in the engine's efficiency and the working life of some components. It is, however, most unlikely to lead to catastrophic failure of the engine.

The port main engine could, therefore, have been used to its maximum power, with little chance of causing serious damage, either to it or to the vessel. Both master and pilot would certainly have appreciated the extra power available during the vessel's final approach to Tower Bridge, and it would undoubtedly have improved the vessel's manoeuvrability.

However, whether this extra engine power would have been sufficient to have allowed *Lord Nelson* to avoid making contact with Tower Bridge, in the latter stages of the accident, is open to question.

Notwithstanding this conclusion, this accident does emphasise the importance of a master being provided with full and accurate details of the status of important safety-critical machinery on his vessel, preferably in writing.

## 2.7 PLA STAFF

When the pilot was issued with the Pilotage Service Order ('A' form) for *Lord Nelson'*s passage up the River Thames, it indicated that there would be bridge lifts at 1000 and 1030 respectively. The document also indicated the time that the lock would be opened to allow *Lord Nelson* to enter the West India Dock, and revealed that the port main engine was not available for use.

It is evident that the lift times for Tower Bridge, shown on the 'A' form, were gleaned by PLA staff from conversations with *Lord Nelson*'s master prior to 15 May. The PLA staff had mistakenly assumed that published procedures had been followed, and that the Tower Bridge lifts had been booked by either the master of *Lord Nelson* or by the Jubilee Sailing Trust.

The PLA did not confirm that a bridge lift request had been made, although a bridge lift schedule had been made available, as is customary, to the harbourmaster (upper) for management purposes.

## 2.8 TOWER BRIDGE

Anecdotal evidence suggests that Tower Bridge bascules are only lifted at the very last minute, and that communication between bridge operatives and pilots/masters is minimal.

The remark the pilot made to the master that “poor contact and late bridge lifting was common”, was based on his, and other PLA pilots’ experience of operations, and communications with Tower Bridge operatives. This experience played a major part in the pilot’s decision to commit *Lord Nelson* to the bridge transit without having first received confirmation that the bridge control room was manned. Had a formalised procedure been in place, requiring early confirmation from both parties that bridge and vessel were fully prepared for the required lift, and had the bridge been lifted in sufficient time to remove any doubt, the accident would have been avoided. Such a procedure would remove any ambiguity introduced by bridge lifts being left until the last minute. It would also ensure that vessels have enough time and manoeuvring space to abort the bridge transit should it become necessary.

Tower Bridge control room operators are not mariners, and may not fully appreciate the constraint pilots and/or masters are under while navigating in confined waters, especially in close vicinity to bridges. The decision to open the bascules is left to the control room operator’s discretion, and is dependent mainly on his/her experience, and the size of vessel, but it is unlikely that vessel manoeuvrability, tidal and other factors are fully appreciated. The bridge operators have advised that they try to minimize the times of raising the Tower Bridge bascules, in order to limit the disruption to traffic flow across the bridge. They state also that it is usual for communications between the control room staff of the bridge, and masters/pilots of transiting vessels, to be kept to a minimum.

Conversely, PLA pilots may not fully appreciate the operational constraints bridge control room operators are under in relation to minimising delays to traffic and the public. A better appreciation and understanding of each other’s role, perhaps in the form of regular liaison meetings, would be beneficial to all concerned.

## 2.9 THE JUBILEE SAILING TRUST (SMS)

The Jubilee Sailing Trust expects masters to be responsible for the safe navigation of their vessels, as stated in its Safety Management System. However, the master of *Lord Nelson* had never transited the bridge while in command of a Jubilee Sailing Trust vessel, and assumed the arrangements for the lifting of Tower Bridge were the responsibility of PLA pilots.

Normally, vessel agents, or the shipping company itself, take on the responsibility for arranging the lifting of bridges or the opening of locks. In the case of the Jubilee Sailing Trust, the master is expected to make these arrangements.

However, there is no guidance in its Safety Management System detailing responsibility. Clear guidance would remove any ambiguity as to whose responsibility it was.

## 2.10 THE PLA RISK ASSESMENT

In the formal risk assessment commissioned by the PLA, in compliance with the Port Marine Safety Code, contact with a bridge is a generic hazard for all bridges on the River Thames. The hazard is ranked low in the overall scale of the PLA's risk assessment. While the rationale behind this is appreciated in the case of static bridges, this accident has highlighted the safety significance of Tower Bridge.

Unlike other bridges on the River Thames, Tower Bridge has opening bascules, to allow larger air draught vessels to transit. It therefore relies on people and organisations other than pilots, masters and crews to ensure safe transit.

The lifting operation, which includes the timing, preparation and advance notice of the opening and closing of the bascules, and the effect it has on vessels transiting the bridge, presents an additional risk to that of other bridges. In this context, there is a need to identify Tower Bridge as a specific and separate hazard within the context of the PLA's risk assessment.

# SECTION 3 - CONCLUSIONS

## 3.1 SAFETY ISSUES

The following are the safety issues which have been identified as a result of the investigation. They are not listed in any order of priority.

1. The lifting of Tower Bridge not being booked in accordance with published procedures. [2.3]

2. Starboard anchor not used to prevent the vessel coming into contact with Tower Bridge. [2.4]

3. No contingency plan in place for the bridge transit. [2.5]

4. The master not being provided with accurate written details of the port main engine. [2.6]

5. PLA staff not confirming the expected bridge lifts in advance. [2.7]

6. No established requirement for early and clear communication between pilots/master's and Tower Bridge control room staff. [2.8]

7. An apparent lack of understanding/knowledge of the pilots/bridge operators' respective roles and operational limitations. [2.8]

8. Responsibility/procedure for bridge/lock transits not clearly identified in the Jubilee Sailing Trust's company procedures. [2.9]

9. The transit of Tower Bridge not considered as an additional risk in comparison with other bridge transits on the River Thames. [2.10]

# SECTION 4 - ACTION TAKEN

## 4.1 THE PORT OF LONDON AUTHORITY

1. Since the accident, the PLA has issued an instruction to VTS (15/2004) which requires VTS operators to confirm that Tower Bridge lifts have been booked in accordance with established procedures.

2. The PLA has also issued as a Notice to Mariners (No 18 of 2004, dated 17 August) updated guidance on the procedures to be used for bridge transits. These procedures cover booking procedures, communications requirements and passage planning.

## SECTION 5 - RECOMMENDATIONS

**The Port of London Authority** is recommended to:

2004/234 Introduce a procedure for the transit of Tower Bridge that requires contingency planning. Such a procedure should ensure the following:

- Early and clear communications between bridge control room operators and pilots/masters.
- An abort point, by which time positive confirmation must be received that the bridge is sufficiently open to permit safe transit.
- Action to be taken in the event of having to abort the transit.
- Tower Bridge staff being informed well in advance of any unusual situations involving the transit of Tower Bridge.

2004/235 Introduce regular liaison meetings between PLA pilots and Tower Bridge management / control room staff.

2004/236 Review its risk assessment with a view to identifying Tower Bridge as a specific and separate hazard.

**The Jubilee Sailing Trust** is recommended to:

2004/237 Introduce clear guidance and instructions, to masters and crews, in its Safety Management System, which address the following:

- Responsibility for arranging the lifting of bridges or the opening of locks.

**Marine Accident Investigation Branch**
**October 2004**