NAVIGATIONAL RISK ASSESSMENT WORKING GROUP 47

13 September 2013

Final Report into the Review of Multiple Contact Incidents at Northfleet Hope Container Terminal (NHCT)

Background

The past 18 months has seen a larger than usual number of berthing incidents at NHCT. Individually each incident was relatively minor, but taken together, particularly as many incidents were clustered around April and July this year, this trend is most unsatisfactory and needs detailed investigation and prompt action.

Following discussion with London Container Terminals (LCT) it was agreed that the NRAWG would be completed in two parts. The first part, held on 25 Jul involved PLA staff, the second part took place at Tilbury on 5 Sept with much wider attendance from the PLA, the Port of Tilbury, LCT, linehandlers and Svitzer.

An interim report, agreed with the Harbour Master at the Port of Tilbury was issued on 16 Aug 2013, this is the final report, agreed by all parties.

Terms of Reference

The purpose of this Navigational Risk Assessment is to discuss and review:

- The contact and other berthing incidents that have occurred in the past 18 months at Northfleet Hope Container Terminal.

- Conduct an exhaustive examination of each incident to include, pilot training and experience, environmental and tidal conditions and procedures in order to identify the cause or causes of these incidents.

- Identify the risk control measures necessary to prevent or mitigate these incidents to include any new or improved procedures or training issues.

Analysis

Of 16 incidents investigated, 10 resulted in contact, 11 occurred on the upper berth and 5 on the lower berth. The one single factor that would do much to prevent recurrence of these incidents would be much better team work and communications between pilot, master, tugs and linehandlers:

- All but two incidents occurred on arrival, both departure incidents (ESTER SCHULTE, LARS MAERSK) were in fact ‘near misses’ that did not result in contact, one was brought about by main engine failure, the other by all lines being let go at once.

- All bar one of the contact incidents resulted in the stern contacting the jetty. The single bow contact case (MARFRET SORMOIU) was attributed to ship misalignment plus crane positioning; positioning the cranes with the booms up so that cranes are abeam the midpoint of the ship would have prevented this incident.

- The Code of Practice for Ship Towage Operations on the Thames 2010 (Ship Towage CoP) requires ships >225 metres loa or draught >10 metres, berthing at NHCT to have an additional tug when berthing stern to tide, at no time were these parameters exceeded.

- 11 incidents occurred with the ship's head up, 5 with the ship's head down, of the 5 head down incidents, 2 did not result in contact.

- 2 contact incidents occurred with 300 metre ships (MAERSK LAGUNA, MAERSK LAVRAS), all others except CMA CGM QUARTZ (259.8m) and VENEZIA (275m) were less than 220 metres.

- The ships in all contact situations were lightly laden.

- It was pointed out that some pilots are accustomed to stopping the engine before rounding Tilburyness in order to give more time for the way to come off, the more experienced pilots present at the Working Group (WG) all agreed that this was not a good practice. **Post meeting note**: One early conclusion from the APOLLO incident underlines the danger with the practice of stopping the engine before or close to Tilburyness.

- None of the vessels were from the German lines, which supports the pilots view that the German vessels are particularly well found with competent crews, good coordination between the stations and the Bridge and well maintained equipment, including functioning bow and stern thrusters.

- Looking at the pilot aspects of the contact incidents:

    - Two cases (MARFRET MARAJO, MAERSK NIAMEY) involved the same pilot; he had less than one years experience as an unrestricted Class 1 Pilot.

    - Two other pilots (MAERSK LAGUNA, CMA CGM QUARTZ) also had less than 1 years experience and two more (MARFRET SORMIOU, MAERSK LAVRAS) had less than 2 years experience as unrestricted Class 1 Pilots.

    - 3 pilots had over 10 years experience and the other had over 6 years experience.

    - All pilots were in date for their simulator training and there was no real correlation between the elapsed time between simulator training and the incident.

    - 2 contact incidents occurred with either a pilot under training or assessment, in one instance (VENEZIA) the supervising pilot had more than 10 years experience and in the other (MAERSK LAGUNA) he had just less than 1 year. One immediate conclusion is that pilots conducting assessment should be the most experienced.

- In two cases, (MAERSK BROOKLYN, MAERSK LAVRAS) following the post-incident analysis, the pilot recommended taking a third tug to prevent the ship becoming misaligned during the time taken for a tug to move from the centre lead aft or the inboard (nearest the quay) side of the ship to an effective push-pull position on the outboard side. The limited room available to the tug for manoeuvring, between two ships berthed at NHCT worsened this problem. When a ship is on the adjacent berth

in strong winds, a third tug should be considered and is required in any event by the Ship Towage CoP when the wind exceeds 25 knots.

- In almost all contact cases the ship became misaligned through an uneven balance between stern tug pushing onto the berth and the use of the bow thruster. Factors contributing to this imbalance in the 10 contact situations were:

    - Beam winds: above Force 7 in 2 cases and Force 4 - 5 in 5 cases. In one case (MAERSK LAGUNA) a Force 5 stern wind was present.

    - On one occasion (MAERSK NIAMEY) with very light airs present a very poor pilot/master relationship was probably the main contributory cause, there was only one other occasion (MAERSK BROOKLYN) when wind was certainly not a factor.

    - The lack of space between the ship on the lower berth and the ship being berthed on the upper berth makes it more challenging for the tugs to work. The WG was unanimous in considering that pilots should anticipate likely events better, particularly in the event of tug failure for whatever reason (Parted line or insufficient sea room) and place the tugs more circumspectly. Better pilot/tug communications would help significantly.

    - In one case (VENEZIA) a helm order was not obeyed, which was not noted by either the pilot or the master.

Discussion

The PLA meeting held on 25 Jul 2013 considered each incident in detail, including individual pilot experience and training. After wide-ranging discussion it was clear that no single factor caused these incidents, rather it was a collection of factors as follows:

1. Vessel alignment – The WG was unanimous in its view that it is crucial to have the vessel squarely aligned with the line of the berth, so discussion moved on to consider why ships were being misaligned. In April the strong north-east and easterly winds that prevailed at the time were probably a factor, exacerbated by lighter ships having considerable windage, but wind was not always a factor. Owing to the cutaway at the stern of modern, large container vessels, a shallow angle off the line of the berth makes it possible for the vessel to over-ride the top of the fenders and the jetty. It is often difficult for the pilot to see the stern owing to the container stack and bridge position; ship's crews often vary in their ability to inform the pilot of the ships proximity to the berth. Sometimes the tug is able to assist, but during berthing, it is often on the other side of the ship in a push/pull configuration. It would help if the linehandlers could also relay the ship's distance off the berth to the pilot on the appropriate VHF channel.

2. Positioning of the vessel – on some occasions there was uncertainty over the precise positioning of the vessel which resulted in the ship being moved up and down the berth and then becoming misaligned with the line of the berth. Several factors generally contributed to the need to move the ship once it has come alongside initially:

    - Wind and tide effects.

    - The marker vehicle not being present when the ship lands on the berth or the marker vehicle subsequently repositioning.

- The man (The 'Blue Hat') with the one VHF set not being in a position to advise on the ship's position, as he had moved away to deal with something else,

- Not having standard reference points for positioning the ship.

- The presence of a large ship of 300 metres loa or more on the lower berth. The pilot will always wait until he is sure his stern is clear of the ship on the lower berth before he lets the tugs push the ship into the upper berth. The situation is compounded by the fact that larger ships may have their bow right at the end of the upper berth and their stern with just 25 metres separation from the ship on the lower berth – a challenging act for any pilot

From discussion at the two meetings it became clear that several measures would improve this situation:

a. The man with the radio (The 'Blue Hat') must stay with the radio.

b. Ideally there should be two radios, this would enable one to remain with the man standing by the marker vehicle and the other could be used by the person needing to range up and down the jetty.

c. There would undoubtedly be much benefit in having a mariner present on the quay during berthing who would understand the ship/pilot's perspective.

d. Usually it is the gangway position in relation to the cranes and mooring bollards that necessitates adjustment of the final position. It might help to maintain a record of particular ship positions (standard berthing plan/bridge position) at particular points on the jetty so that the pilots, ship masters and linehandlers know exactly where to position the ship.

e. A detailed bollard plan with distances marked along the berth could also help to estimate distances more precisely, particularly as the distance from the conning position aboard the ship to the stern and bow will be known.

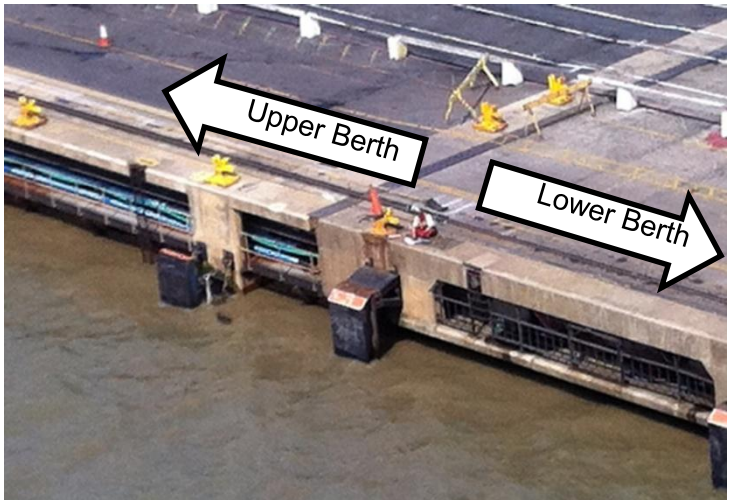
f. Many pilots already make a point of talking to the 'Blue Hat' before they board or leave the ship and it is recommended that all pilots are encouraged to adopt this habit as it would undoubtedly do much to improve communications and enable pilots and linehandlers to have a better appreciation of each other's issues.

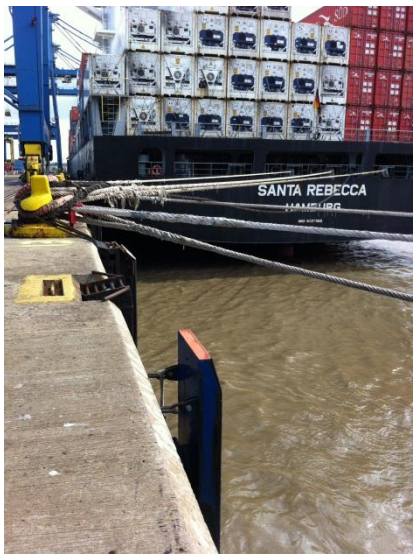
2. Communications – in its widest sense better communications would resolve much of this issue. Owing to the importance of communications the pilot will invariably wish to check communications on VHF 77 (or 72) well before the ship berths, but often it seems that the communications are not manned until the time the ship is actually due at the berth. At the time of making the communications check the pilot will also be seeking information on delays, positioning and berth availability. When two ships are arriving or departing close to one another it is recommended that VHF 77 is used for one ship and VHF 72 for the other. It is further recommended that the linehandlers check communications at least 10 minutes before the ship is due to berth. Furthermore, the person with the radio must stay with and listen constantly to the radio. Also the pilot/tug communications should be improved. Some pilots have spoken directly to the Blue Hat when communications did not go well and from this it seems that the handsets in use are of poor quality with too much static and interference. LCT are already reviewing their VHF equipment and ordering new handsets.

3. Tidal effects – There is a widely-held suspicion among the pilots that the PLA simulator does not exactly mirror the tidal conditions at NHCT. More specifically, the data points in the simulator possibly need to be more concentrated, i.e. more data points per square mile, in the vicinity of the berth to ensure that the down drain and set into the berth are more accurately simulated. The 'down drain'[1] effect is well known, but the more experienced pilots present described this set into the berth as 'vicious' when the tide is ebbing, particularly in the vicinity of the Tilbury Lock entrance (or bellmouth) and its whole effect may not be appreciated sufficiently by all pilots. Also, the more experienced pilots consider the down drain effect diminishes as the time of high water nears. Of the 16 incidents in question, 8 occurred within an hour of high water, thus tidal effects are a significant factor but not the only factor.

4. Code of Practice for Ship Towage Operations on the Thames 2010 (CoP) – It seems odd that the table for NHCT at page 44 addresses ship sizes in 20 metre increments until an loa of 240+ is reached. Also the tables are based on tugs with a bollard pull of 40 tons; most Svitzer tugs now exceed 60 tons bollard pull. Noting that 300 metre ships (and soon 335 metre ships also) are beyond the Part D, Table 1 maximum, this table should be reviewed to ascertain whether more tugs are required for larger ships. Also, in general terms the CoP increases the numbers of tugs for increasing loa and deepening draught, yet the greater windage of lightly laden ships may also require additional tugs. The CoP states also that it applies when '… *weather conditions are favourable and tidal conditions are advantageous…'* and during winds on the beam over 25 knots, an amendment does require that a third tug is required. The CAP SAN risk assessment identified a requirement for a minimum of 140 tons combined bollard pull, either from 2 tugs of 70 tons each or 3 tugs with less.

5. Light ship/fenders – the combination of less laden ships (and so higher out of the water) and berthing at or near HW will render a ship with a cutaway stern or bow more likely to



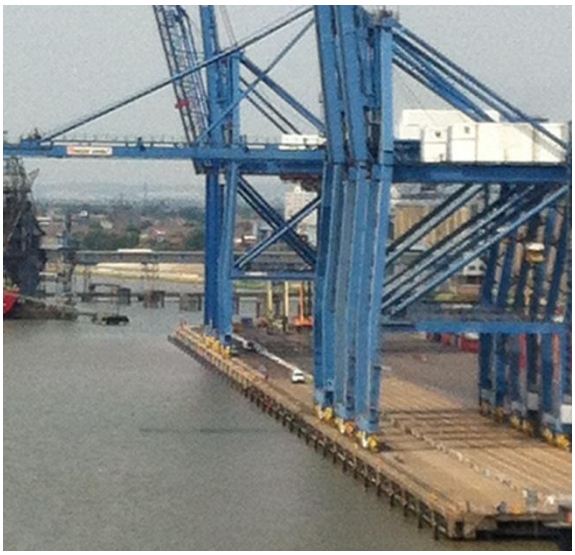


overhang the berth. Although the ship in the right hand photo carries its beam width all the way aft and so rests her stern squarely on the fenders, many modern ships become finer towards the bow and stern and so overhang the berth if too close. Looking at the left-hand photograph above, the fenders on the

[1] 'Down drain effect': - In the vicinity of Northfleet Hope the flood tide sets strongly towards Bevan's and then follows the line of the river setting up a counter-flow in the opposite direction off the Northfleet Hope berths, there is also often an eddy just off the Lock entrance. As the time of high water approaches, this down drain effect reduces, although some pilots think it also moves off the berth and further out into the river as it weakens towards slack high water.

upper berth are approximately 0.5 metres lower than those on the lower berth, so that if the ship is only slightly off the line of the berth it will overhang the fendering and could then land on the un-fendered concrete edge. It is interesting to note that the fenders at London Gateway come higher out of the water than even those on the lower berth shown here. Following publication of the interim report the Port of Tilbury have already investigated with external consultants whether or not the fenders could be extended in height or whether the coping edge could be fendered with a 'half-round' rubber fendering. Early findings indicate that fender improvements will not easily or quickly be achieved and so with the current fender arrangements at NHCT, pilots must take great care to berth the ship squarely aligned with the line of the berth.

6. Crane Booms – From early analysis of the MAERSK NIENBURG incident, it is clear that the quayside cranes should be positioned as close to the middle of the ship being berthed, **not** the middle of the berth; the crane booms must be raised. If for some reason the boom must be left down, the pilot should be warned of the situation through London VTS, as a lowered boom makes it more difficult to line up with the line of the berth. Interestingly, when the PLA Chief Harbour Master accompanied a pilot on 23 Jul, the boom on the upper crane on the lower berth was down and he was surprised by how close the end of the boom was to the bridge of the ship. In one reported near-miss event with the SANTA ROSA, in order to manoeuvre past the lowered boom and overcome the effect of the 'vicious' set into the berth, on this occasion exacerbated by a south-westerly wind, the pilot needed to maintain way on the ship using dead slow ahead. As a result, at 4 knots, the ship was going faster than the pilot wished, requiring half astern to bring way off the ship in time.



7. Conclusions and Recommendations

   a. Ships must be put onto the berth squarely aligned with the line of the berth in good time.

   b. The Code of Practice for Ship Towage Operations on the Thames 2010 already requires an additional tug when beam winds exceed 25 knots in gusts, use of an additional tug should be considered in wind conditions close to this limit.

   c. Notwithstanding the issues identified in the analysis above, it is clear that fenders extending in height to the same height as the coping edge (or higher, such as those at London Gateway) would prevent much of the damage experienced. It is recommended that the port of Tilbury continue with their review of the fendering arrangements.

   d. Improve communications between pilots, ships deck crew, linehandlers and tugs. Clear instruction to the ships crew need to be given by the pilot on the order of which lines to run, and similarly when letting go lines. Sometimes the problem may be language difficulties. It is common for ships officers and crew to be of many nationalities.

e. Pilot Training Panel to write a procedure or guide for berthing at NHCT within the pilots `Guide to Berths and Terminals' (or 'Pilots Handbook'), which is currently being reviewed.

f. Linehandlers to be present at berth and ready to test communications at least 10 minutes before the berthing and unberthing time.

g. Place or paint white or yellow marks on the quayside every 20 metres to assist with estimating distances.

h. LCT to email berthing plan and ship position to DPC in advance of the berthing.

i. Review the tidal data in the Ship Simulator.

j. Review the Code of Practice for Ship Towage Operations on the Thames 2010.

k. Assessing pilots must be the most experienced pilots and on advice from the Pilot Training Panel assessing pilots will in future need to have completed at least 50 unrestricted acts of pilotage.

l. Pilots under training or assessment must give a rolling commentary throughout the voyage so that the Assessing or Training Pilot is able to take action in time should it be necessary.

m. Improve the means of passing post-incident analysis and lessons identified to the pilot body.

n. Pilots to consider carefully how they will place/use tugs.

o. Develop standard berthing plans and gangway positions so that in time all involved will know exactly where the ship should be and where to position the marker vehicle.

p. Ensure linehandlers are provided with effective VHF handsets.

q. PLA and LCT to investigate further the provision of specific training for linehandlers in the use of VHF and in linehandling.

r. Linehandlers to have two people equipped with VHF handsets, both with channels 72 and 77 available so as to avoid confusion between two near-simultaneous berthing operations.

s. Quayside cranes on the berth being approached should be positioned adjacent to where the middle of the ship will be with crane booms in the upright position; if this is not possible the pilot is to be warned in good time.

t. Under normal circumstances the engine should not be stopped until Tilburyness is rounded.

u. As a matter of policy, Svitzer will allocate the largest available tugs to ships berthing at LCT.

v. Ship design and container stacks often prevent the pilot seeing exactly where the tug is positioned, so a tug 'anticipating' what the pilot will need and moving

accordingly could surprise the pilot. PLA and Svitzer have issued a joint communication to pilots and tugs emphasising the need for tugs to keep pilots informed of what they are doing and vice versa.

w. Relevant parts of the Code of Practice for the Safe Mooring of Vessels on the Thames should also be reviewed, as quite a number of the issues raised here (e.g. communications) could very probably be strengthened in that Code and more specific references made to operations at NHCT.

x. LCT personnel to 'trip' with a pilot to gain first hand experience of some of the challenges the pilot, master and ship's staff have to resolve.