

RioTinto

Marine Safety Week Presentation

Confidential

May 2018



Question – how good is our training?

- Reflect back on your training....
- Has it equipped you with the knowledge required to truly understand and then be able to manage in port manoeuvres?
- Has it truly equipped you to manage emergency scenarios?

Being completely honest, whilst I enjoyed really good training, nothing would have provided me with the knowledge and understanding to really understand the issues that I am about to talk about

It was a peaceful Sunday....

- Halfway down the channel the bridge phone goes and the Chief Engineer says one of the generators is alarming on high temperature and that he is switching to another –nothing to worry about you return to your coffee
- 5 minutes later the ship blacks out with the rudder at 25 degrees to port, the ship is at 9 knots
- The vessel continues her slow turn to port, even though there is a tug centre lead aft
- After a couple of more minutes the bow stops turning, the speed reduces and it's pretty obvious that you have made contact with the channel side and run aground. Not the Sunday you were expecting
- The bridge phone goes and the Chief Engineer says he is off to start the emergency generator to restore power. You know it was started a week ago prior to coming into port so you are confident electrical power will be restored quickly.
- You hear the re-assuring sound of the emergency generator starting, then seconds later it stops. Your Sunday is getting worse.
- The pilot is talking to the port authority to secure more tugs, you are concerned that the tide is falling and there is the possibility of the vessel being stranded on the falling tide

The Story Continues.....

- After 20 minutes 4 additional tugs are made fast (luckily there were extras available in the port)
- After 25 minutes of no power the engineers restore electrical and then propulsive power
- The vessel proceeds to anchor where the regulator detains the vessel subject to underwater inspection

- But why did this happen, the ship was nearly 14 years old, the Captain and the vessel had regularly sailed from ports without incident – what was different here?

What went wrong?

- The first generator failed on high temperature
- Subsequently the second and third generators failed in quick succession due to high temperature
- Why? The engineer relied on a manual indicator for a jacket cooling water supply valve that suggested the valve was open – there was no manual check and it was shut – three 30 cent screws had failed
- Whilst the emergency generator had been tested every Saturday, it hadn't been put on load. When it went on load in this instance the radiator fan belt failed the generator stopped. There were no spare on board, moreover you had asked the owner to supply this simple item to the vessel some 6 months previously, but you got busy and didn't check, after all the generator started every Saturday
- After waiting for 3 days to organise divers and await clearance from the regulator the vessel is cleared for her voyage

Bridge Team Management – have you been trained?

- At this stage you are at an incredibly high stress level
- You are speaking your native language with the bridge team and only grunting at the pilot who is busy on the radio with the port and the tugs trying to get assistance
- Have you really been trained for this? Have you drilled for it?
- Has the 2nd mate with 3 years experience of driving a vessel from pilot station to pilot station been trained for this to help you and add value?

Towage – how much do you know?

- At 8 knots on a fully loaded cape size do you know the turning force with 20 degrees port rudder?
- Will a single centre lead aft tug be sufficient? Do you know how powerful the tug is?
- Will your bollards and panama / fairleads cope with the dynamic stress that is required by the tug?
- What is the affect of low UKC on towage? What is the affect of tow line angle on towage?

The missing knowledge - towage?



- Do you know the ratings for bits and deck fittings in towage operations – it isn't the same as for mooring
- Do you know how much force a tug can put on a set of fittings?
- Do you have control over the power of the tug?
- Are you aware of the importance of where to make the tugs line fast?
- Do you control tow line angles?
- Do you know how the age of the vessel might alter your understanding?

Low UKC increases required bollard pull by as much as 400%

As wind speed doubles the force it applies on the vessel squares

Now consider a CapeSize or VLGG-type ship of 200,000dwt. At 8 knots, its rudder produces ≈ 100 tonnes steering force, and at 10 knots this increases to ≈ 150 tonnes (see Table 9).

Age matters

- For ships constructed prior to 2007, there is no guarantee that class rules adequately cover the design of the ship's deck fittings.
- For ships constructed prior to 2012, there is no guarantee that class rules adequately cover the underpinning deck structure the ship's deck fittings are connected to.

Towline angles

To further complicate things, the angle of the tug's towline from the horizontal applies a significant multiplication factor to the forces the tug is creating into its towline and on to the ship's deck fittings. As an example, with the tug's towline angled up to the ship at 60 degrees from the horizontal, there is a multiplication factor of x2 (200 per cent) into the towline and a factor of x1.8 (180 per cent) on to the ship's fittings.

At a 75 degree towline angle, this multiplication factor increases to x3.8 force into the towline and a x3.3 factor on to the ship's deck fittings. For example, a tug producing 85 tonnes BP into the water with a vertical towline angle of 70 degrees can have 248 tonnes force in its towline and 223 tonnes force on to the ship's deck fittings (see Table 8).

Towline Angle up to Ship in Degrees	Towline force in % of Tug's Bollard Pull	Towline Angle up to Ship in Degrees	Towline Force in Tonnes for 85tp Tug
10	101	10	86
20	106	20	90
30	115	30	98
45	141	45	120
60	200	60	170
70	292	70	248
80	576	80	490