Case study for onboard safety meeting
Case study no. 30: Fuel treatment

Please read the below story of an incident. Keep our company's standards and procedures in mind while reading to compare with the actions of the crew below as we will discuss the factors which led to the incident occurring.

A handy size bulk carrier was underway from Asia to Europe. Due to prevailing fuel prices, charterers decided to bunker the vessel to almost full capacity with IFO 380cst-RMG 35 before leaving port. The fuel was delivered by a barge provided by a frequently used supplier, and the quality of the fuel should be in accordance with the applicable charterparty. The vessel had four fuel storage tanks available, including a storage tank which was half full. To use as much as possible of the available fuel capacity the new fuel was mixed with the existing fuel in the storage tank which was only half full.

The Chief Engineer received and signed for two sealed fuel samples from the barge operator, although no samples were taken during the bunkering operation. The company had signed up with a fuel testing programme but due to a very hectic schedule before departure neither of the fuel samples was sent ashore for further analysis. Due to the time pressure, no soundings were taken on board the barge.

After departure the engineers continued to use fuel from the storage tank in use prior to bunkering. Shortly thereafter, they experienced abnormal sludge generation in the purifier, which again resulted in excessive sludge content in the sludge tank. Due to problems with the purifier heaters, the fuel was purified with an inlet temperature of 90ºC. A large amount of water and sludge were drained from the settling and service tanks. After a while they experienced problems with the fuel pumps and fuel injections valves which again caused fluctuations in the exhaust temperature as well as a rise in the scavenging air temperatures. They had to stop several times each day to replace fuel valves, fuel pumps and to clean filters. The service and settling tanks were being drained almost continuously.

The Chief Engineer thought that the problems were caused by the mixed fuel in the storage tank and they switched the fuel consumption to another double bottom tank only containing the newly bunkered HFO, but with the same result. Consequently, the engine crew had to consume the recently bunkered HFO for the propulsion machinery as nothing else was available. As a result the vessel had to reduce speed and slow steam to the next port which was five days away.

The vessel finally arrived at the next port of call several days late. Several fuel samples were taken and sent ashore for testing. These revealed that the fuel was off-specification on several parameters. The owner decided to debunker and ordered new bunkers. During the vessel's stay in port, various repairs had to be carried out to the main engine. All pistons were dismantled and overhauled and piston rings were replaced. One of the cylinder liners was cracked and had to be replaced. The main engine fuel system and turbocharger had to be completely overhauled and the settling and service tanks had to be emptied and cleaned. The whole operation became very costly, time-consuming and caused delays to all involved.

How to improve by lessons learnt

Based on the case and the keywords, you should now perform an onboard risk assessment of the incident and the factors which led to it. Bear in mind our vessel's procedures.

You can also discuss the keywords below in order to determine onboard areas/topics for increased awareness:

- Sampling routines, own samples versus sealed samples provided by the barge operator.
- Routines for bunkering procedures including soundings on board the barge.
- Use of fuel before test results are known. Fuel compatibility problems.
- Injection problems and turbo charger problems. Possible excessive wear due to cat fines.
- The importance of correct temperature of the storage tank. Draining routines and filter cleaning routines.
- The importance of correct purifying temperature, flow ratio and gravity disc (depending on density and type of system).
- Communication between the vessel, Superintendent and shipowner.
- How would you handle a similar situation on board your ship?

1 What factors contributed to the incident in the above case?

2 Risk Assessment: Could some of the factors identified be present on board your ship? (How frequent could they be present? How severe could it be if they are present?)

3 In the risk transfer zone (yellow and red), what would you suggest as measures to control the risk? Any additional barriers that could be introduced?