Case study for onboard safety meeting
Tank cleaning

Gard has recently been involved in a number of cases of cargo contamination as a result of inadequate tank cleaning. This case study describes one such incident to draw the attention of the ship's crew to their operational practices during regular tank cleaning operations.

A chemical/product tanker, on a voyage from Asia to Europe, was loaded with two different grades of cargoes. The vessel had 20 wing cargo tanks, including slops and the final stowage plan had all tanks loaded, except No 9 P/S wing tanks. No 3 P/S wing tanks were loaded with Split Palm Kernel Fatty Acid Distillates (SPKFAD), whilst all the other tanks were loaded with Vinyl Acetate Monomer (VAM).

The vessel was due to discharge the cargoes at multiple ports. The next cargo due to be carried was lube oil, which required very basic tank cleaning. As the vessel had some slack time between subsequent discharge ports, the chief officer had planned to carry out 1.5 hrs of cold seawater wash followed by 1.5 hrs of hot seawater wash during the voyage from one discharge port to the other.

The vessel discharged from 3 P/S and 2P wing tanks at the first discharge port. These tanks were emptied and the ship's crew carried out tank cleaning after departure from the port. At the second discharge port, the vessel discharged COTs, 2S, 4S, 5P, 6P and 10 P/S. Finally, the vessel arrived at the last port to discharge the balance of the cargo. All empty tanks were washed during the voyage to prepare them for the next load.

Upon arrival at the final port of discharge, the receivers drew samples of the cargo for analysis from the nominated cargo tanks for discharge. It was found that the cargo from the 7P wing tank, which was loaded with VAM, had high chloride content and traces of free water. The cargo surveyors then withdrew dead bottom samples which were also sent for analysis and produced results similar to the previous sample. The dead bottom samples also indicated a presence of free water. The vessel carried out ullaging of all the tanks containing cargo and noted that the cargo tanks with the contaminated cargo had its ullage reduced by 30 cm.

Relevant facts were that all cargo tanks had 2-3 fixed tank washing machines installed on the main deck area. The number and location of the machines depended on tank capacity and internal structures. The ship's crew were responsible for connecting and disconnecting the portable tank cleaning hoses between the tank cleaning hydrants and tank cleaning machines during tank washing operations. They were experienced in this task as they had to do 5-6 tank cleaning operations every month.

During the investigation of the incident it was discovered that the tank identification markings/stencils on a number of the tank washing machines had become illegible. Furthermore, there was little horizontal separation between the tank washing machines of the tank that was supposed to be washed (6P) and the one that was eventually contaminated (7P).

How to improve by lessons learnt

Based on the case and the keywords below, you should now perform an onboard risk assessment of the incident and the factors which led to it. Bear in mind the company's SMS procedures when answering the questions.

Please also discuss the following questions in order to increase awareness;

- Discuss possible causes of the cargo contamination found during the last port of discharge.
- Are all your cargo and ballast valves and associated pipelines adequately and clearly marked?
- Does the vessel's planned maintenance system (PMS) have a job item associated with the maintenance and upkeep of all markings and stenciling of the cargo and ballast system?
- What safeguards do you have in place on your vessel to ensure such incidents do not happen on your vessels? List all the safeguards in place.
- Are these safeguards well documented in the vessels cargo operational manual?
- Are these safeguards part of the tank washing checklist and procedures?
- Do you have an item in the shipboard familiarisation checklist to ensure all new joiners are familiar with such critical safeguards?
- What could have been the consequences if the cargo had NOT been compatible with seawater? Name these cargoes with relevance to your trade.
- How can you identify of the valves related to cargo operations?

1 What factors contributed to the incident on board the vessel?

2 Risk Assessment: Could some of the risk factors be identified on board your vessel? What is the likelihood and severity of those factors risk factors?

3 What measures would you suggest in order to mitigate the risk that could lead to such incidents? Any additional barriers of safety that could be introduced?