

Engineering Circular No. 75

NO:ENG/ISM-59(4)/97

Dated:16th June 2006

Sub: Improving safety & providing necessary instruction in the ISM 'shipboard procedure manuals' for ships carrying coconut oil and other vegetable oil as cargo in tanks

Summary: Incident/accident have occurred onboard ships carrying coconut oil as cargo in the ships tanks. This Circular disseminates the information on the incident/accident and draws attention to the hazards that are present and makes recommendations to obviate/lessen the danger.

First incident

1. The ship was carrying a cargo of crude coconut oil for discharge at two ports. None of the tanks were fully discharged until arrival at the second port. The normal discharge process for vegetable oils requires the 'squeezing' of cargo to minimize cargo remaining on board. This operation involved personnel entering the cargo tank during the final tank stripping process.
2. Throughout the discharge the high velocity PV valves were open in free flow mode (vacuum side kept open) and 6 to 7 hours before anticipated tank entry the cargo tank hatch was opened and the inert gas blower was started and run on the fresh air mode during this process, however the inert gas blower was also providing air flow to all the ship's cargo tanks, thus the volume and flow rate to the tank to be entered was greatly reduced.
3. All normal required checks and procedures were made prior to the issue of a tank entry permit. This included the stationing of breathing apparatus and crewmembers on standby in the locality on deck. Checks of oxygen content as well as LEL (Lower Explosive Limit) were also carried out, which revealed that the oxygen level was 20.9% and the LEL was 0%.
4. The Master was equipped with a portable radio as well as a combined oxygen and LEL gas detector and the ships Chief Officer and pumpman were standing by on deck.
5. Once the Master and the accompanying two crewmembers reached the tank bottom they realized that it was becoming difficult to breath and immediately commenced evacuating the tank. Fortunately they managed to reach the upper platform about three metres inside the tank and there, thanks to the prompt action of the standby crew on deck, were immediately evacuated and hospitalized.
6. During the subsequent investigations, it was revealed that the carbon monoxide content of the tank had not

been checked. It was found that the carbon monoxide content in all the tanks was in excess of 3,000 ppm as against the permissible limit of 30 ppm for 8-hour exposure limit or 200 ppm for short-term exposure not exceeding 15 minutes.

Second Incident:

1. A serious accident occurred on board a ship while discharging the cargo of Indonesian crude coconut oil.
2. Six men hired from ashore entered one of the tanks nearing completion of discharge to sweep the residue towards the pump suction.
3. Within a few minutes, the workmen appeared to be in difficulties. Four were able to leave the tank but the other two collapsed over the heating coils. Both men suffered serious burns from the heating coils. One of them subsequently died.
4. The tank atmosphere was tested immediately after the accident for oxygen deficiency and flammability and found to be safe from those hazards.
5. However, very large concentrations of carbon monoxide (CO) were measured more than 1000 ppm.
6. A likely explanation for the presence of large concentration of CO could be due to the temperature of the heating coils that had reached levels high enough to generate CO from the reducing quantity of cargo in the tank during the discharging process.

Recommendations

1. Before entering such cargo tanks, precautions for entry into enclosed spaces described in the IMO Assembly Resolution A.864 (20) entitled Recommendations for Entering Enclosed Spaces Aboard Ship are to be fully observed.
2. The atmosphere of cargo spaces with such oils to be continuously monitored during the discharge process for the presence of CO if it is essential for personnel to be within that space.
3. The temperature of the cargo should be monitored closely during the closing stages of the cargo discharge operation.
4. Procedures to be included in the ships ISM procedure manual under critical operations.

This issues with the approval of the Chief Surveyor with the Govt. of India.

(D. Mehrotra)

Dy.Chief Surveyor with the Govt. of India