

## SYNOPSIS

(All times are BST, UTC+1)



On 17 October 2006, the Hong Kong registered gas carrier *Ennerdale* experienced a major leak of liquefied propane, while cargo sampling operations were taking place, alongside Fawley Marine Terminal (FMT). The leak was sealed 29 hours later, after an estimated 66 tonnes of propane had been lost to atmosphere.

The fully pressurised gas carrier *Ennerdale* arrived at FMT's No. 2 berth at 2300 on 15 October 2006, to load liquefied propane. Preloading checks were conducted and loading commenced shortly after. At 1830 on 17 October the loading operation was halted, approximately 2 hours

before cargo loading was due to be completed, to allow a 'freeze' test to be conducted. A cargo surveyor came aboard and attached his cargo sampling equipment to the sampling point of tank No. 1. The cargo was then circulated for 2-3 minutes. The process was repeated for tank No. 2. With the test results satisfactory, cargo loading continued and completed at 2100.

The cargo surveyor returned to the ship and went straight to the sampling point of tank No. 1, where the chief officer was already preparing. The cargo surveyor used a thread adapter to connect the sampling device to the ship's sampling connection. The chief officer then circulated the cargo, using the deep well pump, to ensure a good representative sample was obtained. The cargo surveyor flushed the sampling device through three times before filling it. He repeated the process, taking four samples in total, before moving aft to the sampling point of tank No. 2. While the chief officer secured tank No. 1, the cargo surveyor prepared to fit his equipment to the sampling point of tank No. 2. As he turned the sampling connection towards himself, the sampling valve assembly came off in his hand.

The chief officer saw and heard a leak and activated the emergency shut down (ESD) valves. Attempts were made to refit the sampling valve but the 11 bar pressure of the cargo, and the formation of ice on the connection, made it impossible. It soon became apparent that the ESD valve adjacent to the tank on the same line as the sampling connection was not completely shut.

The emergency services were alerted soon after the accident and the ship was doused in water sprays to disperse the gas cloud. At 2200, the port of Southampton was closed to all traffic. All ships at FMT were evacuated at 0000. At 0530 on 18 October, with the situation stabilised, traffic restrictions were reduced to a 400 m exclusion zone around *Ennerdale*, which allowed the port to reopen to traffic.

After several options to stop the leak had been considered, it was decided to hot tap the cargo pipework and inject a sealing compound to stop the leak of gas. Furmanite, a company regularly used at Fawley refinery, successfully drilled into the pipework at 1408 on 18 October. The sealing compound was then slowly injected into the pipework, enabling the leak to be sealed and capped at 0240 the next morning.

*Ennerdale* then sailed and anchored in the Solent, awaiting clearance to sail which was contingent upon class approval of the repair and the discharge port agreeing to accept the vessel. This completed, she sailed at 1814 the same day.

The assembly used for gas sampling was designed as a drain point for the cargo pipework system, but had come to be used for cargo sampling when the original arrangement provided for this was deemed unsuitable. The regulatory requirements for gas carriers include very

little guidance on cargo sampling, with no unified standard employed. Industry guidance on sampling was also lacking. Guidance, published in 1989 by the Society of International Gas Tanker and Terminal Operators (SIGTTO), appeared to have been overlooked as industry inspections of *Ennerdale* had not highlighted any concerns with the sampling arrangement.

Inspection of the ESD valve, which failed to close and contain the leak of liquefied propane, revealed that it had been jammed open by a small burr. Although ESD valves onboard *Ennerdale* were tested to ensure their closure rates were acceptable, there was a false assumption that the valves were indicating that they were closed. Although some ESD valves appeared to have been pressure tested by ship's staff, those on the cargo discharge lines were not, as there was no readily available method to do so. There were no records of when the faulty ESD valve was last inspected, tested or overhauled. Furthermore, there is no clear regulatory requirement for ESD valves to be tested or internally examined at periodic intervals, or industry standard for regularly testing of ESD valves in service.

Due to the nature of the leak, the ship's crew were unable to secure the leak themselves. Although the emergency response by the ship, FMT, and local emergency services was good, liaison between ship's staff and the FMT was not ideal.

Recommendations have been made to SIGTTO, Chemical Distribution Institute (CDI) and Oil Companies International Marine Forum (OCIMF) with regard to providing industry guidance on sampling arrangements and procedures. Lloyd's Register has been recommended to take two proposals to IACS regarding the standard of sampling connections, and ESD valve design and periodic testing.

Figure 1

