Shell Gas (LPG) Safety Alert No. 1

Road Tanker BLEVE, Greece

The following report is based on information gathered by Panagiotis Haritopoulos, Shell Gas Greece.

Background

On Fridays preceding national holidays it is a standard police procedure to forbid driving of heavy goods vehicles over 1.5 tons on the national road system in Greece.

On the afternoon of Friday 30th April, an LPG tanker contracted to a local LPG company (Petrogaz) was travelling from Athens to the town of Lamia violating the police restriction.

At 16:20 hours, the tanker was stopped on a two lane highway (with no barrier) by a police road patrol. The driver stopped the tanker half way off the road with its warning lights switched on. Shortly after, a van travelling in the same direction (reported to be speeding) hit the back of the tanker. The van driver was killed instantly and the van caught fire.

The fire from the van moved to the tanker, engulfing the LPG tank - the LPG pump, meter, inlet and outlet couplings and associated pipework were all situated in a metal compartment at the rear end of the vehicle and it is thought likely that the fire was supported by leaking LPG.

The police immediately called the fire brigade and ambulances from local hospitals. Traffic in both directions was re-routed about 1 km away from the accident. A safety area of about 200 - 300 metres radius was set up by the police.

A fire engine arrived 30 minutes after the road traffic accident had occurred and parked parallel to the tanker at a distance of about 5 metres. Three firemen started taking positions to deal with the fire by spraying water to cool the LPG tank. At that point (16:50 hours) the LPG tank BLEVE'd.

Eye witnesses report a 100 metre radius fire ball which ascended 150 metres into the sky. Large drops of burning liquid LPG were dropping from the sky at a distance over 300 - 400 metres away from the explosion. The tank lorry and the fire engine totally disintegrated. Large vehicle parts were projected 200 - 300 metres away (the engine of the fire truck was found 250 metres away). Smaller pieces of metal are reported to have been found at distances over 1 km away from the accident. The LPG tank was projected into a three storey building located 500 metres away, demolished its roof and landed in a field 200 - 300 metres further away (total 700 - 800 metres distance from the centre of explosion).

All three firemen who were close to the centre of the explosion were killed instantly. (Their bodies were found 70 metres away). The tanker driver, standing about 400 metres away, was killed by a piece of flying metal. Thirteen bystanders standing up to 300 metres away were injured and taken to hospital; injuries varied from second degree burns and multiple bone fractures to lighter burns, cuts and bruises. Buildings within a radius of 500 metres were damaged.

Three photos of the accident are attached. One was taken 15 seconds before the BLEVE. The other two show the scene afterwards.

*(Note: If you received this Safety Alert by email, the photos have been sent as 'jpeg' files, *.jpg. They can be opened by any of the following applications: Netscape; Explorer; Quick View Plus; Paintshop).*

Learning Points

The accident is currently being investigated by the authorities and although there are no official reports as yet, contributory factors appear to have been the following:

- The company's dispatching department appears to have disregarded police restrictions as there was no reasonable alternative route that the driver could have taken.
- Vehicle design - The LPG pump, meter, inlet and outlet couplings and associated pipework were all situated in a metal compartment at the rear end of the vehicle and it is doubtful that there was adequate impact protection. Vehicles must be designed to minimise the risk of damage to vulnerable fittings, both in the event of a crash with another vehicle or in the event of a rollover. Wherever possible, such fittings should be located at the side of the vehicle, not at the rear. In all cases adequate impact/under-run protection must be provided at both the sides and rear of the vehicle. (There is also a suspicion that the internal safety valves of the tanker did not function. This cannot be substantiated at the moment but may become clear in the findings of the accident investigation).
- Driver training - Firstly, the driver should not have accepted the routing proposed by the dispatching department as he should have been aware that it contravened police restrictions.

  Secondly, the driver stopped his tanker in a hazardous location, such that it was parked halfway across the carriageway of the road. Instead, he should have: reduced speed; switched on his hazard warning lights; signalled his intention to stop to the police; continued driving until the first safe parking place and stopped there.

  Thirdly, his reported actions indicate that he was unaware of the correct emergency procedures to be followed once the fire had started.
- Emergency services training - The fire brigade parked their vehicle 5 metres from the LPG tanker. The police failed to evacuate people from a sufficiently large area around the tanker. It thus appears that they were unaware of how to deal with an LPG emergency of this nature.

Actions

All LPG businesses should:

- Review dispatching/routing procedures. Ensure that any such police restrictions are taken into account. At the same time, review the routes that your vehicles use to ensure that they are optimum not only in terms of distribution efficiency but also in terms of avoiding accident black spots.
- Ensure the emergency services understand how to deal with LPG incidents. If necessary meet with the authorities to review your and their emergency response plans and ensure that the authorities are clear about how to tackle LPG incidents. You should hold regular exercises with the emergency services, simulating depot emergencies and road transport emergencies.
- Use this information in a toolbox session or training session with all your drivers. Issues you should cover are emergency response procedures and vehicle parking, both under routine and non-routine circumstances. Ensure that these subjects are covered in your driver induction and refresher training programmes.
- Review the design of your - or your contractors' - vehicles. Are all vulnerable fittings adequately protected? Is adequate impact/under-run protection provided at both the sides and rear of the vehicle? Could vehicle visibility be improved to minimise the risk of a head-on or rear-end collision?