CASE STUDY

INTRODUCTION
Title: Fire Incident in LPG Bottling Plant.
Location: Tank Lorry Decantation Gantry.
Result/ outcome: LPG Leak, explosion, fire and injuries to 5 persons

BRIEF OF INCIDENT
A major fire incident occurred in Tank Truck at Tank Lorry Decantation Gantry. Duration of fire was approx. 100 minutes. Five persons reportedly received burn injuries and were admitted to the hospital.

OBSERVATIONS/ SHORTCOMINGS
- On the day of incident, at around 10:00 hrs, 2nd batch of LPG tank trucks were allowed inside the Plant for the unloading operations. The loaded LPG tank trucks are routed through Weigh Bridge for gross weighment and are positioned behind each bay awaiting their turn.
- Tanker no. A was positioned behind the TLD bay no: 02. The driver of the truck then attached the male fittings on LPG liquid and LPG vapour pipeline manifold on the LPG tank truck. The LPG tank truck driver after fixing the liquid & vapour male fittings started the truck and placed the TT in the TLD bay no: 02 for actual un-loading process. In the meantime, TT no. B and TT no. C were placed behind bay no. 1 & 3 respectively. LPG TT from the 1st batch was also available inside the TLD bay no: 01 undergoing vapour recovery process. Similarly, loaded LPG TT’s were awaiting their turn by positioning behind the respective TLD bays undergoing fixing of liquid & vapour male fittings so they can be readily connected to the unloading arms once placed inside the TLD.
- At 10:23 hrs, the said driver of the tank truck no: A (which is placed inside the TLD bay no: 02) reverses the tank truck. The unloading arms (liquid & vapour) are stretched to the maximum and rips the 2" threaded ball valve on the LPG liquid pipeline of the tank truck. Immediately liquid LPG from the tank truck starts to leak.
- Liquid LPG leak from the fully loaded tank truck enveloped whole of the TLD and adjacent area creating a thick white fog and the LPG vapours were seen travelling towards Motor Control Centre (MCC), Diesel Generator room, weigh bridge room, Fire Pump House and main gate.
- Sprinkler in TLD was operated and dispersal of LPG using water monitors was undertaken.
- Somewhere around 10:50 hrs the hazardous atmosphere got the ignition spark which led to Unconfined Vapour Cloud Explosion (UVCE). The fire traced itself back towards the LPG source tank truck TT no: A and started to burn with high intensity.
- Plant personnel continued fire fighting by the way of monitor operation on the affected tank truck and continued cooling of the other two tank trucks which were standing next to the affected truck. The fire from the subject TT- A travelled to the tyres of other two TT’s (B & C) and the tyres of all the three trucks burst. Cabins of all the three trucks have been burnt completely.
- Fire was extinguished at 12:05 hrs and cooling of the other two tankers were continued till 14:00 hrs and after ensuring the pressure in the other TT’s has come down to safe level “all clear” was declared.

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REASONS OF FAILURE/ ROOT CAUSE

- Following are the deviations in SOP:
  - Non-provisioning of the wheel chokes in front & back of the wheels of the TT for preventing accidental movement of the TT before commencing the unloading operation.
  - Keys of LPG TT are not being handed over to TLD operator by the TT driver.
  - The connection/ disconnection of unloading arm is done by tank truck driver and not by company employee.
  - TLD operation is not checked by officer.
- Integrity check of the fitting of male coupler to TT valve, TLD unloading arm connections and LPG leak test to ensure nil LPG leak before commencing the unloading operations is not being done.
- Breakaway coupling of the TLD unloading arm did not get activated in reverse motion of the tank truck.
- Failure of IEFCV operation of the TT due to the bending of internal shaft and housing of IEFCV.
- Failure of shearing of IEFCV at the provided weak spot on the outer valve of the IEFCV.

CONCLUSION

VCB has been tripped 15 minutes after the happening of the incident. As soon as the VCB tripped, diesel generators were switched ON as the same were in auto mode conditioned to start as soon as there is a power failure. The vents of the DG's are towards TLD. There is a possibility that spark would have come from the start of the diesel generators.

RECOMMENDATIONS

- To ensure adherence to SOP’s for unloading operations by TLD operators & drivers.
- Training on safety and LPG operations to be given afresh to all the Plant personnel.
- To provide walkie talkies to all the personnel involved in critical Plant operations.
- To ensure effective supervision by officers in all areas of Plant operation.
- All the critical areas to be provided with static cameras ensuring dedicated surveillance.
- At least 4 hours of battery back up to be provided to ensure working of CCTV system.
- To ensure Breakaway coupling mechanism works in both forward and reverse directions of the movement of the bulk TT inside TLD.
- Breakaway couplings of TLD arms installed in all LPG Plants to be tested for efficacy in both forward and reverse direction of the movement of the bulk TT.
- All future procurements of Breakaway Couplings of loading arm to have a clause for testing of the efficacy of Breakaway Couplings in both forward and reverse direction.
- To develop SOP for isolation of power supply during emergency.
- To strengthen the Access Control System so as to ensure the identity of all the personnel entering the Plant/ hazardous area is recorded. In this particular case the Plant is unable to confirm the identity of the person behind the wheel of the accidented TT at the time of the incident.
- To put in place a system to ensure that at the time of emergency the personnel working inside the plant are allowed outside only after clearance by an authority. In this particular case the driver of the accidented TT left the Plant premises and is since untraceable.
- To ensure availability of the second crew in bulk TT

Liquid LPG Breakaway Coupling inside TLD Bay: 02

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