

# LPG Tank Truck road accident and subsequent BLEVE

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## The Incident:



A loaded LPG Bulk TT, on its way to the unloading destination, was travelling on National Highway when it was involved in an accident at a major intersection. Consequently, there was LPG leakage, vapor cloud formation, fire and, finally, BLEVE causing devastation – loss of more than 20 lives and extensive damage to property of the population living nearby.



## Salient details of the Incident:-

1. The concerned LPG Bulk Tank Truck was loaded with 17.82 MT of bulk LPG. The time in at the loading base was 07.00 and time out was 08.18 as per loading location gate register. As per the said gate register, tank truck was accompanied by tank lorry driver as well as helper.
  2. LPG Tankers are not allowed to ply in the state (where the incident took place) from 6am to 6pm. Therefore, the said TT was waiting at the nearby interstate border till 6pm and finally entered the state through inter-state border check post after 6 pm.
  3. The TT travelled from the check post to the place of incident (a major intersection enroute) in the dead of night and the incident took place there at around 10.30pm.
  4. The approach to said intersection has a steep downward slope with divider (the divider is not of continuous type but isolated blocks in series with gaps in between them) stretching more than 100 meter and followed by a blind curve. There was also a cross roads cutting across the main NH. There is no speed breaker / rumble strip on the approach to this part of the highway. There was no divider prior to this junction either.
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5. Due to the above terrain, blind curve, steep downward slope, crossroads and absence of speed barrier/s to the descending vehicles, the said intersection is itself an accident prone zone. As discussed with the local persons, 25 accidents have been reported at the same place during last one year and a similar incident took place at the same junction one week back. There was no fire in that incident as it involved an empty LPG Bulk TT.
  6. As per eye witness, the LPG Bulk TT lost control while coming downward in a blind curve and the prime mover (Horse) of the vehicle crossed the divider and got struck in between. Due to impact on the vehicle, the free-wheel Hinge Pin got broken off and the prime mover got disengaged from the Bullet. In the process the LPG valve manifold also got damaged. Thereafter LPG started leaking from the damaged LPG manifold.

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7. Driver of the said LPG Bulk TT immediately advised nearby houses and shops to vacate stating that fire can take place any movement. Local residents alerted State Electricity Board who put off the grid power supply immediately. The LPG continued to leak for about 20 minutes and huge LPG vapour cloud formed at the sites. Subsequently, the LPG vapour cloud caught fire –



source of ignition is yet to be established. Thereafter, 3 explosions took place consecutively. BLEVE conditions existed and BLEVE probably took place. The front dish end of the bullet with 1/3<sup>rd</sup> of the cylindrical shell of the bullet flew away



almost 400 mtrs. in a green field. The rest of the Bullet plates were rendered flat. With these three explosions, the rear wheel and the front wheel of the LPG Bulk TT also flew away in different directions of the road. All the nearby houses and shops were damaged due to fire and explosion. On the date of investigation, 20 people were reported to have died and 17 people were still admitted with burn injury in hospitals. People who were inside the house were saved but those who came out from the house and running along the wind direction got burnt badly. Fire Brigade reached the spot but could not approach the vehicle before the explosion took place. The driver was arrested by police at a later date. The tank lorry was not accompanied by helper at the time of accident.



8. As per available record, driver was having valid license duly indorsed by RTO for carrying hazardous good however the validity of hazardous goods of the driving license was expired. As per concerned OMC record, the empty TT entered the loading location along with the driver & helper but the LPG Bulk TT was found to be running without helper on road when the incident took place.
9. As per available record of loading OMC, the said driver loaded the same TT three times ex the loading location prior to this accident but he was going with the said TT to the concerned stretch of road for the first time. As per the check list issued by the involved OMCs, validity of endorsement in the driving license for carrying hazardous goods was valid but the copy of the document provided to the investigation team indicated that the same expired long back.

### Action by the Investigation team covered the following:-

1. Survey of the stretch of road travelled by LPG Bulk TT.
2. Visit to the accident spot, interaction with the eye witnesses, collection of photographs and analysis of the tank truck conditions.
3. Interaction with RTO officials (enroute from loading location to the accident spot) & TT crew members of other bulk LPG Tank lorry (available enroute).

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4. Interaction of the officials of the loading location, collection of documents and study of prevailing system followed by the OMCs concerned for Bulk TT Loading assistance.
5. Root cause analysis and framing recommendations remedial measure

### **10. Root cause of the accident:-**

1. Historically the place where the accident took place is an accident prone Zone. No speed limit is defined while approaching to that spot from either side of the road. No caution board, divider signal, curve signal, speed barrier are provided on the either side of the road. No pedestrian zebra crossing signal is painted on the road. While approaching from loading location side, this was the first divider put on the road without any signal.
2. Restriction on TT movement in Highway during day time imposed by local State Govt imposed fatigue related hardship/inconvenience on the drivers forcing them to drive only during night time.
3. Although loading location routinely ensured presence of both TT crew members during TT loading within the location premises but there was little or no control on ensuring presence of both the members for TT on road.
4. LPG tank lorry valve manifold got damaged due to high impact resulting in uncontrolled leakage of LPG.

### **Recommendation:-**

1. Proper signage's to be displayed on the both side of the highway cautioning driver and pedestrian about the traffic rule and road conditions. A physical Speed barrier / rumble strip needs to be provided before such accident prone zones.
2. OMC to represent for review of the current restriction imposed by the state government and relaxation to be made for movement of POL & LPG tank trucks on the highway during day time to minimize night driving fatigue to the driver.
3. Law enforcing agency of the state government should implement MV Act in true spirit without any deviation ensuring 2 member crew in heavy vehicles at all the time as stipulated in the explosive license issued to the TT.
4. OMC to device a mechanism to put in control measures to implement transport tender conditions w.r.t safety conditions even outside the terminal while on transit and strict action should be taken in case of violation.

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5. Design changes in the manifold of LPG Tank lorry to ensure:
  - a. Adequate protection to the manifold to ensure that in case of accident minimum damage to the manifold / valves takes place thus preventing the leakage during such emergency.
  - b. In-case of major damage to the manifold - suitable design changes in the Excess Flow Check Valve (EFCV) to prevent uncontrolled leak to the external. This may also include the review in material of construction of the EFCV to increase its strength and avoid its consequent damage which at present is brass – a weak link between the LPG valves and the Tank Truck shell.
  - c. Industry to implement of VTS and AVS on all LPG TTs in line with such features in POL TTs.
  - d. Online driver safety records along with personal details like driving license, validity, hazardous validity, address, Telephone No. to be maintained by OMC for easy identification.