

# Safety Measures Adopted in Transportation of LPG (Bulk and Cylinders) by Road (Case Study of LPG Truck Accident in Kerala)

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*Chemical (Industrial) Disaster Management (CIDM):  
Technology, Capacity Development, Disaster Risk Reduction  
of Hazardous Industries, Ports and Storages of Petroleum,  
Petroleum Products and Natural Gas*

## LPG TANK TRUCK FIRE AT CHALA, KANNUR, KERALA

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## CASE STUDY



12.11.2013, Chennai



## The Accident

Date & Time: 27.08.2012, 2300 hrs

Spot Chala Junction, NH-17, Dist Kannur

TT Route MLIF to Kochi LPG Bottling Plant. 200 Km from Mangalore . Double Road flanked by houses, shops. Hilly terrain

Product 17.82 MT of LPG

Nature Disengagement of bullet from chassis , Shearing of EFCV, pipeline, LPG leakage, BLEVE



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## Incident description

NH-17 is a double lane Road without a divider for the major part

The Accident spot is steep downward slope and has a divider/median, stretching for a length of more than around 100 m. It was raining and road was fully wet.

Due to poor visibility driver could not gauge the presence of divider, hit the divider, Prime mover got disengaged from the Bullet due to shearing of the turn pin, pipeline manifold got damaged, LPG bullet got disengaged from the rear wheel chassis, heavy leakage from manifold



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## Incident description, Cont'd

The driver immediately approached nearby houses / shops and alerted them to vacate. Many residents immediately vacated.

The LPG leaked for about 20 min. and huge LPG vapour was developed at the site. The LPG cloud caught fire and there was a big explosion. Due to this explosion the LPG bullet sheared into two pieces, followed by 2 more explosions. Front dish end of the bullet flew and fell nearly 400 meters away

Loss of Lives-20                      Injured-21  
Property Damage : 50+ House and Shops and 10 vehicles



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## Accident-Contributing factors

Unscientifically constructed dividers on Highway without reflectors and warning glow signage at junctions

Unsafe Driving Practices- high speed ( 40-50 kmph) on wet inclined road with poor visibility

Poor Visibility at main junction due to poor lighting & Poor Weather condition

No entry to heavy vehicles into State of Kerala during day time compelling drivers to drive during night hours

Absence of helpers in the TT .



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## Accident Spot



**Remains of Prime Mover after BLEVE & Blaze**









## ROAD TRANSPORTATION

Road transportation is one of the significant mode of dispatch of petroleum products in Marketing Sector. This is an area where maximum accidents have occurred. According to the data, of the total accidents in Marketing Sector in the period of past 05 years, contribution of road transportation was 70%. Some of the measures that could improve reduce Road accidents or its effects are:



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## Steps to reduce accidents & effects

- Regular training to drivers on safe driving skills & emergency handling measures through RTO approved training centres
- Reduce hazardous Goods transport through road by increasing pipeline network
- Improve Highways – Road Surface eliminate blind spots, provide Illumination, warning signs at critical junctions, review accident prone zones
- Review design of existing Tank trucks to reduce impact on tank nozzles during accidents to prevent leakage



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## Steps to reduce accidents & effects

- Regular and strict checks on vehicle fitness and condition by Plant ,RTO & PESO Competent person
- Remove administrative restrictions prohibiting driving of hazardous goods vehicle into States during day time
- Ensuring availability of helpers in TTS at all times
- Provision of internal EFCV to ensure product does not come out in case of damage to manifold valves
- Sensitizing public residing along highways through which hazardous goods trucks pass through local administration on safety measures in case of accidents



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## Do's and Don'ts

- Transporter should depute only a trained driver having Heavy vehicle license with helper
- Driving License of the driver should be endorsed for Hazardous Goods.
- All the documents of the TT should always be present all the time with TT.
- All safety fittings should be in working condition and valid certificates related to them should be present all the time with TT.
- All the testing related to TT and its fittings should be done on time.
- All wiring of the TT should be checked regularly.



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## Do's and Don'ts

The fire extinguisher should be regularly checked and date of checking and TT no should be painted on it.

Tanker should carry portable road carrier.

TT should be equipped with a First-Aid box.

It should make sure that all the labels written on the tanker are clean and legible.

It should be ensured that vehicle is not left alone any time even if parked.

Transport Emergency Card should always be present with the TT.



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## Transport Safety- Rules & Standards

The Motor Vehicles Act 1988 with latest amendments. & Central Motor Vehicles Rules, 1989

Static & Mobile Pressure Vessels (Unfired) Rules, 1981

OISD-STD 159-LPG Tank Trucks - Requirements of Safety on Design/Fabrication and Fittings

OISD-STD 160- Protection to fittings mounted on existing LPG tank trucks

OISD-GDN 161- LPG Tank Truck Incidents : Rescue & Relief Operations

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## **Safety Requirement- Bulk & Packed Trucks**

- **Welded Spark Arrestor**
- **Cut off Switch 4 Poles**
- **Diesel Tank Guard, Lock, Spill Proof system**
- **No Loose Wiring, Fuse, MCB**
- **Floor Rubber Mat (Cylinder Truck only)**
- **Tight Fitting of Cylinders (Harnessed and vertical)**
- **Emergency Information Panel**
- **No Dents/ Damage etc**
- **2 X 10 Kg DCP Firex**
- **Anti-Lock Braking system (**



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## **Safety Requirement- Bulk LPG Trucks**

- **SRV Test certificates**
- **Class 300 Flange**
- **Pressure Gauge**
- **Temperature Gauge**
- **Roto Gauge**
- **Height Barrier**
- **Valid License/ Certificates**
- **Internal EFCV**
- **Protection guard for Manifold**



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## Emergency Rescue Vehicle (ERV)

ERVs are placed at following LPG Plants/Refinery

Region	IOCL	BPCL	HPCL	Total
North	Ajmer	Piyala, Japiur	Bahadurgarh, Bhatinda (HMEL)	05
South	Devanagonthi (B'lore), Cochin	Coimbatore	Mangalore	04
East	Durgapur		Vizag	02
West	Hazira	Uran, Jalgaon	Usar, Manglia (Indore)	05
Total	05	05	06	16

Under procurement- IOC-5 (Raipur, Shahjahanpur, north guwahati, Balasore, Patna )



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## BULK TT SAFETY CHECK LIST

S. No.	Physical examination
1.	Suitable spark arrestor of make and design approved by CCE, Nagpur, welded to exhaust available.
2.	2 no. 10 kg. DCP extinguishers in easily accessible and removable position with truck no. date of checking painted on it, available (frequency of check monthly) and kept on both side of cabin.
3.	Quick closing manifold valve with lever indicating close and open status available and original levers are provided.
4.	No visible dent on the bullet/ no apparent damage observed/ no corrosion on bullet / paint of bullet is OK
5.	Height barrier is provided in the form of a cage either as 50 mm diameter pipe 50/50/3 MM angle frame on the top of the vessel and within the height regulation of road transport authority.
6.	Fuel tank is protected by means of stout guard and fuel cap is licker
7.	IOC identification no. is painted on the both side of cabin in bold block letters of minimum 100 mm. Height
8.	Internal of fire extinguisher in good condition.



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## BULK TT SAFETY CHECK LIST

9.	HAZCHEM sign, name of contractor, with address and telephone no. Displayed prominently on the both end of the bullet and at the rare side
10.	Liquid/ vapor lines are adequately anchored and are well protected by means of stout steel guard and in single piece from excess flow check valve to discharge valve.
11.	Safety fitting viz. safety relief valve, roto-gauge, pressure gauge and temperature gauge are adequately protected and all are operational.
12.	Excess flow check valves are functioning
13.	Name of contractor"(min 100 mm. height) is painted in bold block letters across the length of the bullet on the both side.
	<b><u>ELECTRICAL</u></b>
14.	Aluminum strip for earthing arrangement welded on all 4 side of the bullet pedestal
15.	All junction box are properly sealed
16.	No loose electrical wiring / terminal
17.	Electrical wiring is insulated and provide with suitable over current protection/ fuse
18.	Truck is self starting
19.	Readily accessible master switch for switching off engine is provided inside the cabin.



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## BULK TT SAFETY CHECK LIST

	<b><u>LICENSES &amp; DOCUMENTS</u></b>
20.	TREM CARD, instructions booklet detailing instructions on handling emergencies enroute, available
21.	TT driver's training certificate available and DL endorsed for hazardous goods and chemicals.
22.	Route map available.
23.	Valid CCE license and authenticated copy of drawing available.
24.	RTO permits and pollution control documents available.
25.	RLW – ULW greater than or equal to licensed capacity
	<b><u>GENERAL</u></b>
26.	First aid kit available
27.	8 studs and wheel chokes used during decantation.
28.	4 no caution sign board with luminous paint for stopping traffic in case of any emergency are available.
29.	Steel gaskets used for spool piece connection.
30.	Tanker Safety Kit / Emergency Kit available.



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## Tank Truck Incident

### In case the TT crew is in a position to act: Crew must inform-

- **Nearest LPG Installation / otherwise**
- **Nearest Depot / Terminal of any Oil Company AND**
- **Nearest Police Post and Fire Brigade.**

#### Note:

- Truck not to be left unattended.
- If phone unavailable, message through other TTS / Volunteers.
- If First message received by Police/Fire Brigade/Depot/Terminal, message to be passed on to LPG installation of any oil com

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## RESCUE & RELIEF OPERATIONS

### •What to Convey ??

- a) Location : milestone no., Highway, village / town, other landmark.
- b) Registration No. of TT, name of the Transporter
- c) Date and time of incident
- d) TT empty or full and the quantity
- e) Proceeding from/ on way to
- f) Casualty or injury
- g) Leakage / fire and its source
- h) Position of TT after the incident on road
- i) Safety Precautions taken
- j) Help required (tools & tackles, jacks, crane, empty TT, ambulance, Fire tender)

•Information readily available should be relayed, details may follow.

•Documentary proof of such intimation to Police Post / Fire Brigade / Retail Outlets should be retained.

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## RESCUE & RELIEF OPERATIONS

### •By LPG Location- Simultaneous action

#### 1. Communication to

- Nearest Fire Station.
- Nearest Police Station or Police headquarters.
- District Administration.
- Transporter
- Concerned Oil Company -Zonal / Region and Head Office
- CCOE / Zonal Controller of Explosives, as applicable.
- Oil Industry Safety Directorate.

•If a Depot / Installation is located near to the site of incident, inform such location for rendering immediate assistance, to the extent feasible.

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## Tank Truck Incident

### 2. Rescue Planning By LPG Location- Simultaneous action

**As per situation decide to**

- Rush Rescue team with equipment
- Despatch empty depressurized Tank Trucks
- Requisition Emergency Rescue Vehicle from nearest Industry Plant
- Oil Industry Sales Personnel to provide assistance through local agencies

•Rescue team to assess the Incident Category.  
•And to guide professional fire fighting people of the Fire Brigade/Industry

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