तेल उद्योग सुरक्षा निदेशालय
Oil Industry Safety Directorate
ISO 9001:2015 certified

सुरक्षा संवाद
Suraksha Samwad

An opportunity to learn from mistakes....

Disclaimer

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Sh. Ranjan Mehrotra

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Shri Ranjan Mehrotra has done his Bachelors in Mechanical Engineering from Motilal Nehru National Institute of Technology, Allahabad.

He has more than three decades of experience in Indian LPG industry. Ranjan has rich experience in LPG Plant Operations and Maintenance, both as operating hand and overall In-charge of location.

Due to his two stints in LPG Projects, spread over 12 years, he has accumulated a vast resource of knowledge and expertise in LPG Plant design.

According to him, the biggest and brightest feather in his cap is design and coordination for LPG Bottling Plant at Leh – world's highest altitude LPG Bottling Plant.

He is presently holding the position of Director (Marketing Operations) at Oil Industry Safety Directorate, Noida and is overseeing and steering the safety in Indian Oil & Gas industry especially LPG.

सत्यमेव जयते

“Fire in LPG unloading gantry”

Ranjan Mehrotra
Director (Marketing Operations)
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The Incident

Location: Tank Truck (TT) at Tank Lorry Decantation Gantry

Injuries: Five persons reportedly received burn injuries and were admitted to the hospital.

Sequence:

- 1st batch of the LPG tank trucks were taken inside the plant at 07:00 hrs.
- 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 were routed through Weigh Bridge for gross weighment and were positioned behind each bay awaiting their turn.
- Tanker no. 'A' was positioned behind the TLD bay no: 02

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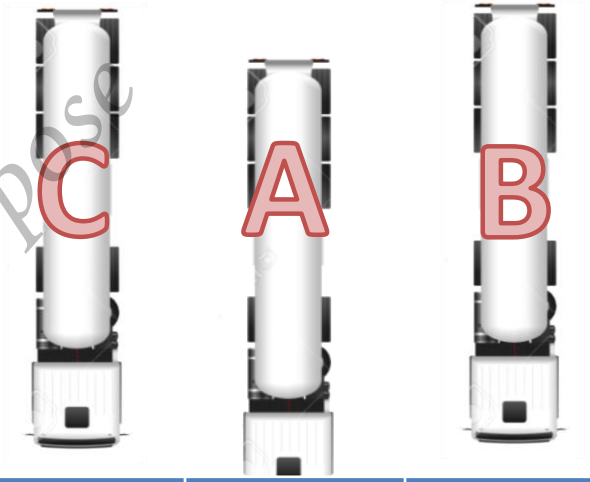
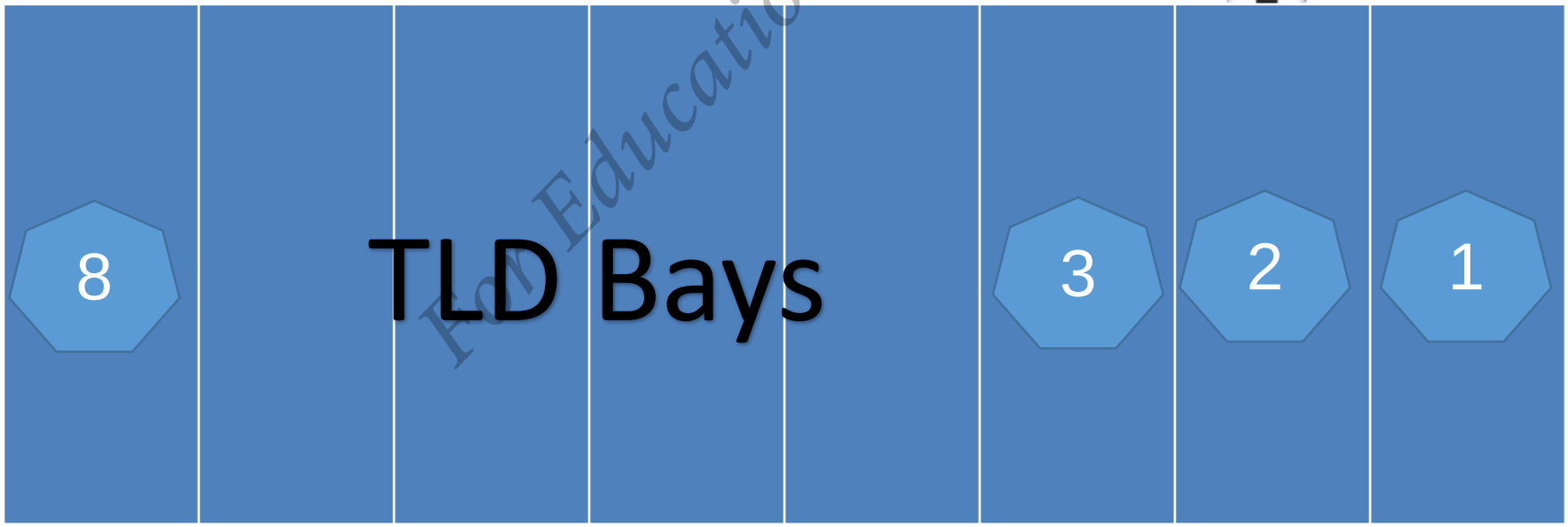
The Incident

LPG Bulk Truck





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The Incident

- The driver of the truck then attached the male fittings on LPG liquid and LPG vapour pipeline manifold on the LPG tank truck.
- In the meantime, TT no. 'B' and 'C' were placed behind bay no. 1 & 3 respectively.
- Similarly, loaded LPG TT's were awaiting their turn by positioning behind the respective TLD bays undergoing fixing of liquid & vapour male fittings.
- At 10:23 hrs, the driver of the tank truck no. 'A' (which was placed inside the TLD bay no: 02, and connected to TLD LPG liquid and vapour LPG pipelines via unloading arms associated with breakaway couplings) reverses the tank truck.

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The Incident

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The Incident

The Incident

- The unloading arms (liquid & vapour) were 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 started to leak.
- Liquid LPG leak from the fully loaded tank truck enveloped whole of the TLD and adjacent area creating a thick white fog/ cloud.
- LPG vapours were seen travelling towards Motor Control Centre (MCC), Diesel Generator room, towards weigh bridge room, fire engine room and towards main gate.
- Some where around 10:50 hrs, LPG vapour gets ignited which led to Unconfined Vapour Cloud Explosion (UVCE).
- The fire travelled back to the LPG source Tank Truck No. ‘A’ and started to burn with high intensity.

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The Incident

- **The leaked TT which caused the incident**

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The Incident

- **Damaged TLD**

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The Incident

- **Damaged adjacent TT & TLD**

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The Incident

The Incident

- **Manifold valves & IEFCV's of subject TT**

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The Incident

- **Internal EFCV of incident TT**

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Observations

- Internal Excess Flow Check Valve (IEFCV)

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Observations

- **Operability of Breakaway Coupling**

Breakaway coupling/ emergency release couplings which have been installed in this Plant are not designed to release in backward/ reverse direction of the movement of the TT

- **Supervision of TLD**

From the CCTV footage it is observed that the fitting of the unloading arms and opening of the LPG valves from the TLD manifold LPG pipelines is done by the drivers and no intervention from the TLD operators or supervision of officer.

- **CCTV**

PTZ camera has been provided at Tank Lorry Decantation.

Critical areas of the Plant such as LPG Pump House are not under continuous CCTV surveillance.

- **Uninterrupted Power Supply**

Battery back-up of the CCTV system was found to be for very short time.

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Observations

- **Man Power Deployment & Supervision**

There are two officers posted in first shift at the time of the incident.

The worker deployed at TLD was not present at the time of incident, hence effectively the TLD operations were unsupervised at the time of incident.

- **Violation of SOP's**

a) Wheel chokes are not positioned.

b) Checking integrity of the LPG arms connection not done.

c) The operator was not available at his work spot.

d) TLD operator is not provided with Walkie-talkie.

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Reasons of Failure

- Non adherence to SOP's.
- 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.

Auto Starting of Diesel Generators

VCB has been tripped after the happening of the incident.

As soon as the VCB tripped diesel generator switched ON as the same was in auto mode conditioned to start as soon as there is a power failure.

The vents of the DG's were towards TLD.

There is a possibility that spark would have come from the start of the diesel generators. Unexpected outcome of expected condition.

No standard SOP available for isolation of power during emergency.

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Recommendations

- Adherence to SOP's for unloading operations by TLD operators & drivers.
- To ensure operators do not leave their work spot for any reason unless the operation is completed.
- 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.
- To ensure Breakaway coupling mechanism works in both directions.
- To develop SOP for isolation of power supply during emergency.

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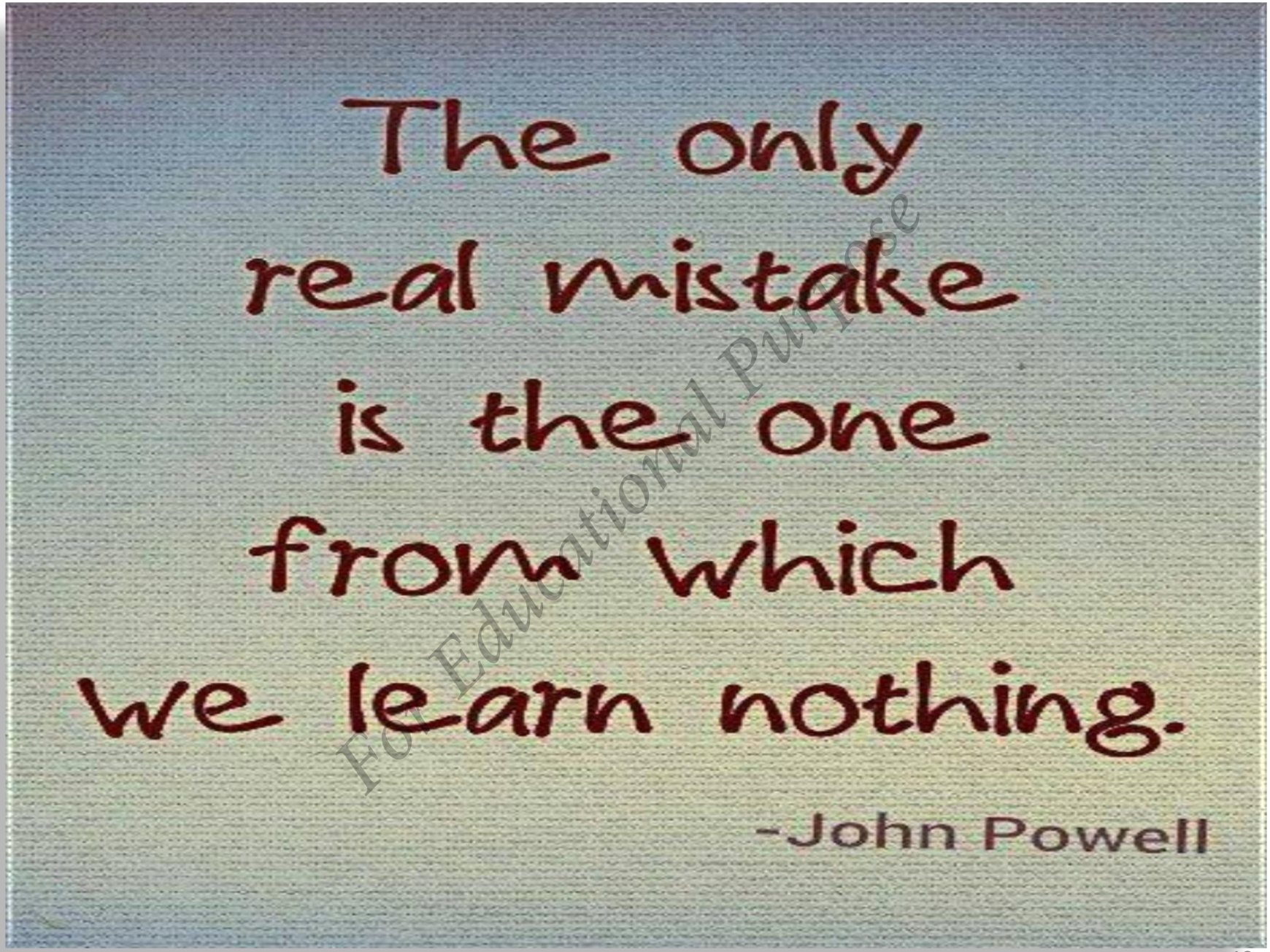

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Are we learning from Incident?

Are we sharing the learning?

Unsafe act….Unsafe situation

….near miss ……

Incident Investigation

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Whenever a PSV pops up,
Why-Why is must.

It’s not going to be easy…

Change never is…

We just need to have the courage…
to take the first step.

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