

Case study- Fatal Incident at Installation

Brief of the Incident:

A major explosion and fire incident took place at one of the installations involving 2 fatalities and 3 injuries. The incident happened during Motor Spirit (MS) transfer operation from one tank to another tank using portable pump with its motor connected with non-FLP (Non-Flame Proof) electrical switch board in the dyke itself.



Non FLP switch Board –source of Ignition

Analysis of the Incident:

In the transfer process when tank level was below the dead stock, two side manhole covers of the MS tank were opened keeping pumping operation on. This caused accumulation of rich hydrocarbon vapour in the vicinity of MS tank in the dyke.

When pump suction failed, it was decided to stop the transfer operation. While stopping the pump, immediately there was huge explosion followed by fire near the manhole of the tank. Initially, the fire started near the non-FLP switch board and subsequently travelled to manhole of motor spirit tank & further propagated inside the tank.

The incident resulted in fatality of 02 persons (1 officer & 1 contract workman) and burn injuries to another three persons (1 officer & 2 contract workmen).

Root Cause:

Opening of both side manhole covers of MS tank without following any laid down procedure coupled with carelessness & without opening top manhole cover for aeration. Above has caused accumulation of MS vapors in the vicinity of tank and around the motor/non FLP electrical switch board

Due to sudden stoppage of running motor, spark generating from non FLP switch board ignited the rich MS vapors resulted in explosion and fire.

Major lapses leading to this incident are:

- 1. No proper job safety analysis before commencement of hazardous jobs*
- 2. Non adherence to SOP/work permit in line with OISD Std-105 which is evident from unauthorized opening of manhole covers of MS tank without work permit*
- 3. Non issuance of electrical permit for electrical work i.e. connection from LT panel to Non-FLP switch board without considering electrical hazard applicable in zone 2.*
- 4. No MOC (Management of Change) for transfer of product through water draw-off lines of tanks.*

Some of the major recommendations emerging out of this incident to improve the safety practices and to prevent recurrence of such incidents in future are.

Recommendations:

- Proper Job Safety Analysis covering all hazards & risks involved along with adequate mitigation measures should be carried out prior to commencement of any critical operations / jobs
- Project works being executed at operating locations should not compromise the safety infrastructure of the location
- Usage of non-FLP junction box / switch board should be strictly prohibited inside tank farm area/operating area.
- All critical activities must be supervised by a competent officers and role holders.
- Double earthing to the motors should be ensured.
- Work permit system as per OISD-STD-105 should be strictly adhered to without any lapse.
- Manhole covers should not be opened unless all associated risks have been assessed and mitigation measures taken.
- All operations should be carried out strictly as per SOP.
- Presence of hydrocarbon to be checked with the help of explosive meter prior to commencement of any critical activity.
- Unhindered access to firefighting equipment must be ensured.
- Motor-able approach road to be provided to enable free movement of fire tenders.
- Integrity of fire screen must be ensured before carrying out any hot work.
- It should be ensured that cut branches / dry vegetation are immediately removed from the hazardous area.
- Electrical permit shall be issued for all electrical jobs executed at the location.
- Electrical equipment should strictly conform to the Hazardous Area Classification (OISD-STD-113)
- MOC should be processed and approved by the appropriate authority before undertaking any job for which laid down procedures/SOPs are not available.

- It is apparent that lessons from the previous similar accidents have not been learnt by the officers at the locations and repeating the same mistakes which are proving to be fatal.
- Chart with history of all fatal accidents (post Jaipur, Hazira, Madurai & Tirunelvely) with root cause and no. of fatalities to be displayed at prominent places in the location for awareness.
- Based on the incident, it is evident that necessary safety training has not been imparted to the terminal staff for undertaking such critical jobs. Therefore OMCs to impart training on safety including behavioral safety to all operating people extensively.