

## Case Study: Major Fire at Industry Tank Wagon Siding

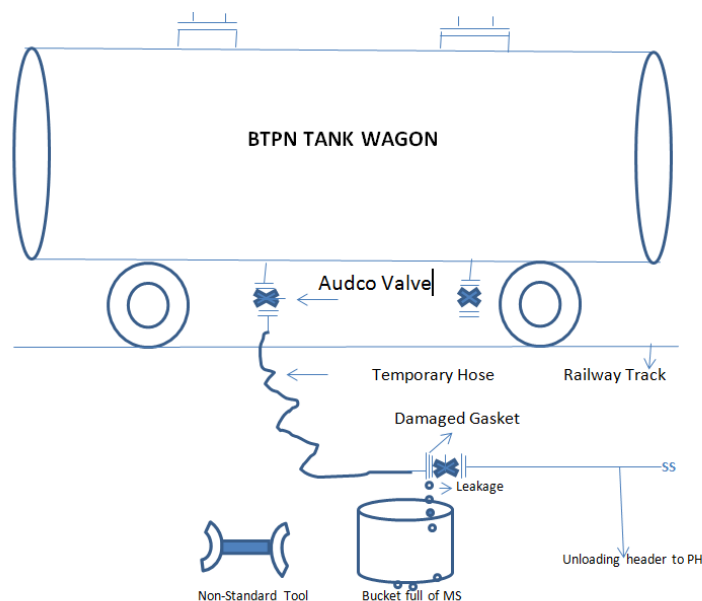
### *The Incident*

A major fire broke out in one of the tank wagon decantation railway siding of Oil Company during the first fortnight of January 2015. The fire continued for more than 3 hours and valuable products (65 KL of MS & 35 KL of HSD) got burnt due to the fire. The Railway Siding Operations got severely affected & remained shut-down for a considerable period of time. There was no fatality or major injury to operating crew.

### *Sequence of events*

The mixed tank wagon placed in the gantry as stated above was to be unloaded at the location - 96 % of the products for one particular company while the balance ( 02 wagons) for other. As per the norm, the railway TXR group checked the fitness of all the associated valves of tank wagon prior to issuing fit / placement certificate.

- The wagons were placed in two spurs.
- An officer from the location reported at the siding with contract workers for unloading the rake. The concerned officer checked the quantity & quality of products in the Tank Wagon including proper hose pipe connection from tank wagon to the unloading header for all the wagons except 2 MS tank wagons which were meant for other company. The unloading operation thereafter commenced for this company.
- Subsequently, the officer from the other company also witnessed the quality & quantity of products in the 02 wagons, however, left the site advising contract workers to connect the unloading hoses.



**Schematic Line Diagram**

- On completion of hose connections of the 02 TWs, contract workmen opened the master valve of TW, bottom valve and unloading header valve and MS unloading operations from these 02 wagons started.
- While unloading was in progress, contractor workmen noticed that MS was leaking from the flange joint connecting tank wagon unloading header and unloading hose of one of the MS tank wagon. The spilled MS was being collected in a bucket.
- Without closing the bottom valve and master valve of the MS tank wagon, contract worker tried to tighten the bolt of the flange joint with a spanner to arrest the leakage. While tightening, the gasket between the unloading header & the hose got ruptured, which resulted in heavy leakage of MS & vapour cloud.
- During the process of tightening, the spanner slipped & fell down resulting in generation of spark. The MS vapors immediately caught fire due to the spark and subsequently the MS tank wagon was engulfed by the fire.
- The 10 Kg DCP fire-extinguisher was charged to extinguish the fire but the attempt failed; tank wagon unloading operation was immediately stopped.
- The uncontrolled fire spread to the adjacent tank wagon containing HSD-the cooling of the other adjacent wagons with water was started.
- In the meanwhile, 06 fire tenders of State Government joined the firefighting operation (around 20 minutes was taken for mobilization of these tenders).
- Eventually, the fire got extinguished after the entire product in 02 affected wagons got completely burnt out.
- The fire-fighting successfully managed to avoid spreading of fire in other tank wagons.

### *Losses*

- 02 wagon loads of MS and HSD got completely burnt.
- Railway track & slippers also got damaged in the fire thus suspension of product supplies.
- Other indirect losses like arranging product supply from alternate location to meet the market demand in the affected location.

### *Root Cause*

- Not following the proper sequence of operation during tank wagon unloading- violation of SOP. The primary reason of the fire was due to violating the sequence of valve operation during unloading operation coupled with use of non-standard tools.
- Use of non-sparking tool for tightening the flange. Further, it was noted that the gasket used were of inferior quality. As per norm, 75-Kg DCP extinguisher must be available for fire-fighting which was not there in the instant case.
- Improper supervision including not carrying out tool-box talk.

## *Learnings*

- Sequence of valve operation during unloading / loading of TW must be properly explained to the field staff to avoid mistake in operation.
- Use of proper tools to undertake maintenance activity; non-sparking tool must be used for any maintenance activity while handling highly hazardous product like MS. Right quality of gasket must be used for the flange joints. Further tightening of flanges while unloading is a risky proposition - the bottom valve at the TW should have been closed which would have avoided the major fire.
- It must be ensured that there is proper and effective supervision during the operations.
- Job safety analysis must be carried out before commencement of any operations.
- Security staff and contract workers must be trained to handle emergency scenario.
- Effective communication system should be maintained at the siding.
- Adequate firefighting equipment must be provided in the railway siding.
- House-keeping at railway siding, proper approach including escape route must be ensured at all railway sidings.

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