

## CASE STUDY

OISD/CS/2025-26/P&E/17

Dt. 07.11.2025

### INTRODUCTION

Title: Fire in 2" hydrocarbon drain line.

Location: Slug Catcher Area in Gas Processing Plant.

Loss/ Outcome: Unit outage & production loss, damage of instrument detectors and cables.

### BRIEF OF INCIDENT:

A hydrocarbon leakage occurred from elbow in a 2" drain line in a 18" gas interconnection pipeline adjacent to slug catcher area followed by a major fire. Firefighting operations were immediately initiated. The affected pipeline was isolated and adjoining sections were shutdown. Depressurisation and cooling measures were undertaken simultaneously. The fire was contained locally within 30 minutes and extinguished in around 2 hrs 40 mins. No casualties were reported in connection with the incident. Normal operations at the GPP were restored on the next day.

### PHOTOGRAPHS:



### OBSERVATIONS / LAPSES

- 18" interconnection line was commissioned more than 25 year ago. The pipeline was installed to facilitate pigging operations and maintenance activities of the slug catcher & pressure reducing skid system. The modification was carried out without any Management of Change (MOC)/ HIRA analysis. The pipe was of XS schedule whereas the elbow was of schedule 40, implying inconsistency in design likely on account of non-preparation of general arrangement drawing (GAD)/ piping material specifications which are a part of MOC process.

*This Case Study is based on the Investigation report done by OISD and published for information purpose only. This information should be evaluated to determine if it is applicable in your operations, to avoid recurrence of such incidents.*

- b. Lapses in the work permit process were observed such as permit renewal without site visit, inadequate hazard identification/ toolbox talk, job safety analysis, etc.
- c. The list of authorized work permit signatories was not available.
- d. No crash barrier or barricading was observed on the periphery of the slug catcher area.
- e. Periodic comprehensive inspection of piping was not evident. Only thickness survey was carried out around 2 years ago. Further, there was no practice of small-bore piping inspection.
- f. It was observed that non-flame proof lighting was provided in nearby facilities/ area towards which the vapor cloud had moved. Further, the flame proof integrity was found compromised in one of the electrical junctions located in the nearby facility (boiler flame scanner cooling air fan). Records for junction box and motor flame proof integrity check was not evident (as stipulated in OISD-STD-137).
- g. No Hydrocarbon detector was observed in the flame scanner cooling air fan suction area.
- h. The slug catchers were taken in line next day of the incident without carrying out damage analysis of the piping.
- i. Vegetation growth in the slug catcher area was not escalated in any of the safety committee meetings and the same was not reported as unsafe condition. The same issue had been highlighted in the recent ESA.

### **CONCLUSION / ROOT CAUSE**

The cause of hydrocarbon leak was the JCB hitting the 'L' shaped 2" drain line (located at the proximity of road) of the 18" interconnection gas line in the slug catcher area during the scrapping of Road for cement surfacing work. The latent failure was absence of marking/ barricading around the protruding drain line as well as non-availability of crash barrier/ barricading on roadside to protect the pipelines.

The systemic lapses included improper hazard identification, deviation in the work permit renewals, non-compliance with Management of Change (MOC) procedures.

### **Probable source of ignition:**

The probable source of ignition was from nearby scanner fan of boiler (i.e. Scanner fan sucked flammable gas along with atmospheric air as suction) or from the non-flameproof fittings and compromised integrity of existing flameproof fittings located in nearby road.

### **RECOMMENDATIONS**

- a. Any modification, as illustrated in OISD-STD-178, shall only be undertaken after following proper MOC procedures.
- b. Permit should be issued/ renewed only after due diligence. Periodic audit of work permit system should be carried out. Structured training of concerned personnel should be ensured. All potential hazards, associated with the job, should be comprehensively identified & addressed in Job Safety Analysis (JSA). The hazards and their control measures should be disseminated through Toolbox Talk (TBT). Furthermore, the control and prevention measures shall be implemented and verified prior to issuance/ renewal of work permit.
- c. Crash Barrier or physical barricading shall be provided along the slug catchers to prevent any impact on the hydrocarbon lines.
- d. All the piping system shall be inspected (External & Comprehensive inspection) in totality as per clause 7.0 of OISD-STD-130 inclusive of small-bore piping and dead legs.
- e. All the electrical fitting shall be inspected as per the periodicity defined in clause 6.0 & 6.7.viii of OISD-STD-137 to ensure its flame proof integrity.
- f. Hydrocarbon detector should be considered for the forced draft type flame scanner cooling air fan in boiler. Upon detection/activation trip logic should initiate trip of the scanner fan to avoid hydrocarbon ingress into the system.

- g. Comprehensive health assessment (visual inspection, hardness testing of piping, microstructure testing of piping, etc.) of any fire affected area should be done for determining the reliability of equipment, piping, supports, electrical cable etc. and necessary repair to be undertaken before start-up.

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