CASE STUDY

OISD/CS/2024-25/E&P/17 Dt.: 11.03.2025

INTRODUCTION

Title: Fatal Fire incident in Heater Treater

Location: Onshore location, GGS.

Loss/ Outcome: Loss of human life & other damages due to fire.

BRIEF OF INCIDENT:

On January 7, 2025, HT(Heater Treater)-3 was shut down for PSV calibration job. Later, HT-3 start up was initiated prior to completion of PSV (Pressure Safety Valve) installation, while PSV team was preparing for PSV installation. Around 15:20 hrs, crude oil began overflowing from the open flange of the PSV of HT-3.

The fire was noticed shortly after the above incident in HT-3 area. One person got engulfed in the fire and rushed to medical college but declared dead.

The fire team along with the fire tender reported at site at around 15:22 hrs and the fire was extinguished by 15:40 hrs and cooling down was initiated and site was declared all clear by 17:00 hrs.

OBSERVATIONS/ SHORTCOMINGS

1. The feeding of crude to HT-3 was through RC 1 Pump. HT-3 and RC 1 were stopped for PSV calibration. Later, Pump RC-1 was started without ensuring the installation of PSV on HT-3.
2. JSA was prepared highlighting general hazards and precautions of PSV calibration. The following points of the JSA were not complied with.
   a. Depressurize the vessel and empty it before taking up the job.
   b. Only remove the PSV after the vessel is depressurized.
   c. Take the vessel in line only after fixing the PSV and observe for any abnormality.

   No record of Heater Treater HT-3, level or details of valves closed were found. No evidence of positive isolation of HT-3 was found.
3. Permit to Work (PTW) was created for the general job of PSV calibration at GGS, also it was not an approved PTW. Also, the maintenance team took up some routine maintenance job on the pump RC-1 but no Work Permit was found for the same. The pump was locally locked out by blocking on / off switch. No record of lock out / tag out (LOTO) found.
4. No record of Heater Treater HT-3, level or details of valves closed were found. No evidence of positive isolation of HT-3 was found.

5. No record of safety briefing provided to the PSV calibration team prior to start of the job was found. Also, no safety Briefing was given to OISD accident investigation team at the time of entering the installation.
6. As per the contract, following violations were noticed.
    a. MVT records of contractual persons were not available.
    b. Valid Competency Certificates of the competent person(s) were not found.
    c. The detailed methodology for facilitating the Testing, Servicing, Repair and Calibration of vessels and PSVs at the mentioned sites was not found.
7. It was observed that additional two holes were created in HT-2 burner assembly to increase air flow, however no management of change (MOC) document was found.
8. PSV isolation valve was not provided at the HT 3 because of provision of regulation 111(6) of the Oil Mines Regulation (OMR) 2017 which stipulates that:

    "There shall be no valve or fitting between the pressure apparatus and its pressure relieving safety device or between the device and the point of discharge, as would render the device ineffective."

9. PSV test bench was set up in front of Heater treater shed under a tree. However, no approval for the same was found.
10. Installation has 15 nos. of CCTV installed to cover the gate & perimeter of the installation. 12 nos. of CCTV were working on the day of the incident. No CCTV coverage was available for the Heater treater area.

    As informed, all CCTV went out of operation at 15:02 hrs due to power fluctuations and could be restored at 16:55 hrs. It is noted that the plant was operational & other equipment was also running during this period, which casts doubt on the claim of CCTV outage due to power fluctuation.

11. HT area was installed with 6 nos. of fixed gas detectors. As per provision, only a local alarm and GGS gate alarm are sounded and no automatic plant shutdown or any other action is linked with gas detection.

    During the discussion at site, it was informed that the alarm of the hydrocarbon detector was activated prior to the fire incident.

12. A Cell phone (not intrinsically safe) was found lying in crude oil between HT 2 and HT3 which shows a practice of carrying non-intrinsically safe mobile inside installation/process area.
13. The following points of 10 safety rules of the company were not adhered:
    a. Work with a valid permit when required
    b. Ensure a safe system of work
    c. Do not use mobile phones in operational areas.

    As above, it appears that practice of following safety rules was missing, and it indicates lack of safety culture and inadequate risk perception at the installation.

14. A fan in burnt condition was found between HT2 and HT3. Its presence there could not be explained.

REASON OF FAILURE / ROOT CAUSE

1. Recycle Pump RC-1 was started without ensuring the installation of PSV (Pressure Safety Valve) on heater treater HT-3 which shows lack of safety culture and casual attitude towards critical jobs inside installation.
2. The recommendations of the JSA (Job Safety Analysis) were not followed.
3. Non-adherence to Permit to Work system, Standard operating procedure (SOP).
4. Non-adherence to Contract clause.
5. Management of Change (MOC) was not followed.
6. Non-adherence to safety rules of the Company.

CONCLUSION

The unfortunate incident was avoidable. It is seen from the observations that accident occurred due to failure of multiple barriers simultaneously as indicated in the root causes.

RECOMMENDATIONS

1. Before starting any equipment, it should be ensured that the system is lined up. Safety culture and risk perception at the installation should be improved.
2. The work permit system & JSA should be followed for all the maintenance jobs in line with OISD-STD-105. Also Lock out Tag out (LOTO) permit should be followed for all electrical jobs.
3. Organization should ensure that:
    i. MVT records of contractual persons are available.
    ii. Valid Competency Certificates of the competent person(s) are available.
    iii. The detailed methodology for facilitating the Testing, Servicing, Repair and Calibration of vessels and PSVs at the mentioned sites is prepared.
4. All contractual workers and visitors should be provided with safety briefings prior to the entry inside the installation.
5. Organization should ensure compliance to contract clauses. There should be a person responsible for monitoring it. The person should be competent enough to monitor the job.
6. All modifications in the installation should be implemented after MOC.
7. Matter for incorporation of isolation valve before PSV should be taken up with the regulator. The same is followed in downstream oil & gas industry as per regulatory and OISD standard requirements.
8. The installation of the test bench should be ensured in a safe area and it should be properly fixed on the ground. Please refer to OISD case study OISD/CS/2021-22/E&P/04 dated 28.12.2021.
9. Positive isolation should be ensured for all jobs where vessels are to be opened.

Reference as per Cl no. 7.11.1.5 of the 'Working Group' report on safety in Indian petroleum sector, August 2023,

Quote

"Unit Turnaround philosophies are to be reviewed from a safety point of view also in case of staggered turnarounds with the shutdown of some of the units or some parts of the units. Additional precautions like water curtains, stand-by fire trucks, positive isolations, portable hydrocarbon sensors, portable smoke/ flame detectors, dedicated turnaround area coordinators from operations etc. may be deployed as needed."

Unquote

10. Non-intrinsically safe mobile phones should be prohibited in operational areas. Communication should be through intrinsically safe Cell phones / walkie- talkie in compliance to clause 8.3(2) & 8.3(3) of OISD STD 189.
11. CCTV cameras should be provided for the entire process area to monitor operation. Also, it should be provided with power back up and storage for preservation of recording.
12. Shift logbooks and handing over taking over should be maintained as per Cl 7.6.4 of OISD-GDN-206.
13. Recording of fixed gas detector should be available for examination when needed.
14. 'Not in use' equipment should be removed from the workplace.
15. Safety rules of the Company should be followed in totality.

PHOTOGRAPHS OF INCIDENT

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This Case study is based on the Investigation report submitted by committee 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.