



SAFETY ALERT

OISD/SA/2020-21/P&E/02

Dt.:12/10/2020

INTRODUCTION

Title: **Fatal fire incident during blind removal**

Location: **Refinery**

Loss/ Outcome: **One fatality**

BRIEF OF INCIDENT

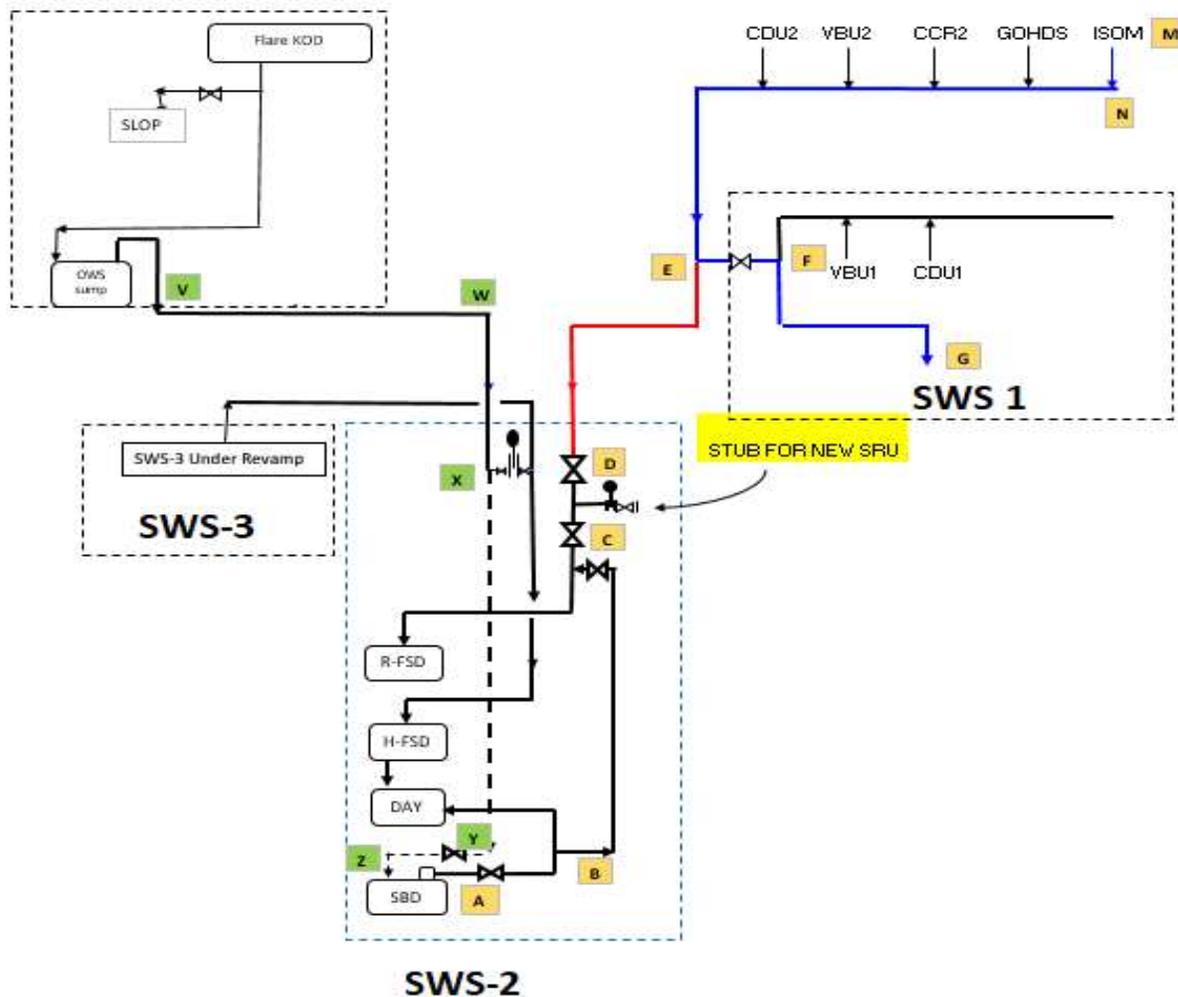
- A fatal fire incident took place in one of the Indian refineries during the activity of blind removal from sour water line stub at battery limit of Sour Water Stripping (SWS) Unit. There was a gush of water with hydrocarbon from the line which caught fire. The fire caused burn injuries to two workmen who got trapped in the workspace. One of the injured succumbed to his injuries during treatment after a month.

OBSERVATIONS/ SHORTCOMINGS

(Refer attached PFD for clarification of following point)

- Refinery has total three numbers of SWS units namely SWS-1 (Site of incident), SWS-2 (running at the time of incident) and SWS-3 (under revamp).
- In SWS-1 unit, one stub with valve was provided at the battery limit to route the sour water from a new SRU unit, which was under construction phase. There was a blind in this stub which was inserted at the wrong position i.e. upstream of the valve; This made its removal unsafe without shutdown of that unit. Hence the removal was planned during one of the unit shutdown days.
- Prior to this, after a total shutdown, the flare was taken back on line one week before. As water was expected due to steaming of flare header during shutdown, the flare KOD drain was routed to SWS system.
- As flare OWS linked SWS-3 was under revamp, a temporary hook up (circuit X-Y-Z) was made from battery limit of SWS-3 to Sour Water Blow Down sump (SBD) of SWS-1, through which flare OWS was received in SWS-1 (Via circuit V-W-X-Y-Z) and then routed to SWS-2 via an interconnection line (Via Circuit A-B-C-D-E-F-G).
- ISOM unit was started just one day after the flare start-up and trend showed unit disturbance and liquid (containing HC) carry over to flare KOD during start-up. This reached SWS-2 via SWS-1 (via circuit V-W-X-Y-Z-A-B-C-D-E-F-G).

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- Sour Blow down (SBD) content was fully discharged to running SWS unit (SWS -2) just hours before the incident (via the routing A-B-C-D-E-F-G mentioned above). In the process, line content of the long pipe section 'D-E' also got filled up with HC+ Water mixture.
- Subsequent to above operation, both battery limit valves (C and D) of sour water line (SWS-1) were isolated and section C-D was drained. No liquid was observed by operator during the draining through hose connected to Low Point Drain (LPD).
- Necessary cold work and working at height permits were issued. The area operator had shown and explained the job to the workmen and left the site.
- As the workmen started loosening the bolts to remove the blind, liquid started oozing out from the flange. Assuming that it was water, the workmen continued the job and removed the blind. At that instant, there was a gush of water with hydrocarbon from the line. Subsequently, fire broke out there.

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- The duration of the fire was for about 8 minutes and as the workmen were trapped in the workspace and were wearing safety harness, they could not escape from the area promptly. They sustained burn injuries and were shifted to the hospital for treatment.

REASONS OF FAILURE/ ROOT CAUSE

- The presence of hydrocarbon pocket in the stagnant pipe section 'D-E' was not anticipated by the Operating staff.
- The drain of the spool could have got choked during draining due to the sludge/ air lock; But since the line was used earlier in the morning and no liquid was observed during draining of Section C-D (after its isolation), the operating crew might have derived the wrong inference that the spool had got completely drained and was under full isolation by the battery limit valves.
- The isolation valve (D) of the refinery sour water header might have been passing due to the sludge under its seat.
- The hydrocarbon in the sour water line had predominantly come from the flare KOD subsequent to ISOM start-up.
- The stress relieving job at the bottom of the spillage might have been the most probable ignition source.
- As the workmen were working on the temporary platform with safety harness tied to nearest support, they could not escape immediately from the area which resulted in burn injury.

RECOMMENDATIONS

- Any new modification job shall be thoroughly checked based on drawing/ format (e.g. the wrong position of blind in stub).
- Any temporary modification (e.g. Section X-Y-Z) should be done through MOC procedure only. If a modification is interlinked with different units, a standard operating procedure/ JSA involving all stakeholders to be developed and explained to all concerned.
- The workers should be briefed about the conditions, the possible/ residual risks of the job and emergency procedures (like escape) in Tool Box Talk (TBT).
- Proper assessment of risk to be made taking into account all the events/ activities/ abnormalities in upstream, downstream and parallel operating stations and implement a comprehensive mitigation plan. for e.g.
 - a. Routing to SWS should have been stopped based on the level rise (due to HC) in flare KOD and checking of material in the KOD drain to OWS.
 - b. No liquid flow during draining of the previously used line should have been interpreted as a possibility of choking of hose / LPD also.
- Work permit system needs to be strictly adhered to.
- Operation personal / Contractor supervisor to witness such jobs as per the permit to observe any abnormalities. (Presence of Contract Supervisor or Area operator during start of job might have prevented the incident.)
- Hydrocarbon detector to be provided near to the flare KOD OWS system.

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