Root Cause Analysis Report
Chevron Richmond Refinery
October 5, 2018 H2S release with recordable injury

Date & Time Event Began:

October 5, 2018 2:00 PM

Date & Time Investigation Started:

October 5, 2018 2:30 PM

On Site Emergency Response:

Contract employee taken to forward clinic for observation. Block valve tightened closed. Air testing conducted showing 0 readings for H2S, CO & LEL.

Interim measures:

Area secured and barricaded to prevent entry of non-essential personnel

Agencies Notified, including time of Notifications:

No agencies notified

Off-Site Emergency Response:

No off-site impact or emergency response

Incident Summary:

On October 5, 2018, a contract. employee was conducting Quality Assurance/Quality Control (QA/QC) checks at the plant plot limit of a Hydrogen Recovery unit (20 plant). The individual's personal four gas monitor alarmed and displayed instantaneous readings of 200 ppm H2S, 61 ppm CO, 9% LEL, and 20.8 O2. The individual took several steps and then loss consciousness. The individual was assisted by a coworker, regained consciousness and was transported to the forward deployed clinic for evaluation.

Event Summary:

On October 5, 2018 approximately 12:00PM, Operator 1 was executing procedure R20N3010, prepping for Step 13.7 to release 14" lean gas line to maintenance for blinding. This step required the use of double block and bleed to verify line the was de-pressured fully by opening the bleeder to atmosphere. After 12PM, Operator 1 removed the bull plug from ¾" bleeder and opens valve on the 14" sour gas line to verify line was de-pressured and clean. If the system sniffed clean, the operators would be able to downgrade the PPE requirements. The MX 6 gas tester Operator 1 was using alarmed indicating the line still had elevated levels of H2S/hydrocarbon in system. Operator 1 then closed the valve, placed the bull plug in bleeder valve, and contacted a more senior operator to get input on path forward. Operator 1 wanted to understand if additional cleaning was needed or to proceed with Step 13.7 on procedure to install blinds or if other actions could be taken.

By 1:30PM, 2 QA/QC contract personnel were verifying flanges and blind installation at the 20-plant plot limit. Before 2:00PM, the more Senior Operator, Operator 2, opened the ¾" bleeder on the 14" sour gas line to verify the line was isolated and clean. Operator 2 also confirms the lines in unclean and sniffed dirty. Operator 2 closed the valve by only hand tightening the valve and told Operator 1 they would need to come back to this line for additional

clean up and to move on to other more critical steps in other areas for shutdown work. Operator 2 instructed Operator 1 to not release this line for blinding until further clean up could be concluded.

At 2:00PM the 2-contract employee's walk downwind of the ¾" bleeder and valve and 1 contract employee's four gas monitor alarmed. Contract employees moved to evacuate from area by descending stairs on plot limit platform. While moving down the stairs, the contract employee who's four gas monitor alarmed, fell unconscious, landing on air hoses nearby. The contract employee's personal four gas monitor displayed readings: 200 ppm H2S, 61 ppm CO, 9% LEL, and 20.8 O2. Second contract employees four gas monitor showed 0 readings for H2S, CO and LEL. The contract employee regained consciousness and was assisted by a co-worker to the nearby Forward Clinic.

Operator 1 rushed back to the ¾" bleeder on 14" lean gas line and re-tightened the valve with a wrench. The valve handwheel moved slightly indicating the valve may not have been fully closed. By 2:10PM, Chevron Fire Department (CFD) was contacted by Chevron Safety. At, 2:17 PM CFD arrived on scene. CFD tested the air to ensure the area was secure and safe. By 2:17PM, barricade tape was placed around site to continue plant cleanup efforts.

Causal Factors, Root Causes & Corrective Actions:

Causal Factor #1: No removal of non-essential personnel from the plant prior to removing bull plug on ¾" bleeder and opening valve.

Root Cause: Policy Needs Improvement

Corrective Action: Develop safety topic of the month for this event with Operating crews. Reinforce the requirement to remove non-essential personnel from the area when de-pressuring systems and during plant shutdown activities. Reinforce the expectation that operators will limit and restrict work in those areas by placing barricade tape around hazardous area with tags to inform personnel of issues.

Combine in this review the need to check for leak by or tightness on valves particularly when the bull plug will not be reinstalled on the valve during clean up/depressuring efforts.

Root Cause: Standards, Policies, or Admin Controls (SPAC) confusing/ incomplete

Corrective Action: Update the procedure for 20 plant shutdown (R20N3010) to repeat warning around removing personnel from area and place barricade up to restrict access. The warning should be added at section of the procedure where venting or de-pressuring to atmosphere may occur or should be added to every other page of the procedure due to the potential for H2S in this area.

Causal Factor #2: Valve hand tightened to close.

Root Cause: SPAC confusing/ incomplete

Corrective Action: Combined in action item above to share this incident with area operators to stress the importance of confirming valves are fully closed on hazardous systems that will be vented to air, which may require the use of a wrench to confirm valve is fully closed on this type of system.