H2S Gas Leak at CBNC HPP Line-2 Sulfurization During Plant Start-up Operations

November 18, 2022

0022H

ACTIVITIES FOR THE SULFURIZATION PROCESS START-UP

- At 2130H H2S injection commenced to start Batch Reaction. H2S gas was injected to pressurize MS Reactors.
- To maintain or reduced pressure at the MS Reactors excess H2S gas is vented to the Scrubber through control and manual vent valve. Control valve is operated through DCS and manual vent is at field with an assigned personnel.
- Start-up activities is being closely monitored by Japanese Staff and Filipino Supervisors.
- The reading Scrubber CEMS (206AI013) was closely monitored and Caustic Soda (NaOH) injection was adjusted even the 206AI013 reading was still low to prevent H2S leak.
- At around 0020H U00AI902 (near JMAINT Office) has an alarm but zero reading. Field operator also informed DCS that there was an alarm on the area. Then immediately informed DCS operators to check if there was a possible gas leak at MS Reactors and advice H2S personnel to stop or standby the activity at R2211.
- 0022H 0032H border detectors 201AI901 and 201AI902 (inside perimeter of the HPP) alarmed with reading more than 0.2 ppm (HH setting of detector), 201AI901 = 1.4 ppm and 201AI902 = 1.6 ppm., triggering the ESD of Line 1 and Line 2.
- Series of reading also detected by H2S process detectors (reading 1-4 ppm) mostly located at Line 1 H2S Plant area and at this time informed all personnel including contractors and sub-contractors to wear H2S gas respirator and immediately proceed to assembly area and to wait for further advice.
- CBNC Safety personnel instructed and guide them to Evacuation Area A (Utilities Area).
- 206Al013 (206SR03 CEMS) DCS:25ppm; Gastec: Over Range (Gastec Tube Range: 0-20ppm)
- Zero Reading of the detector outside of the plant (Southside): 09AI940 0

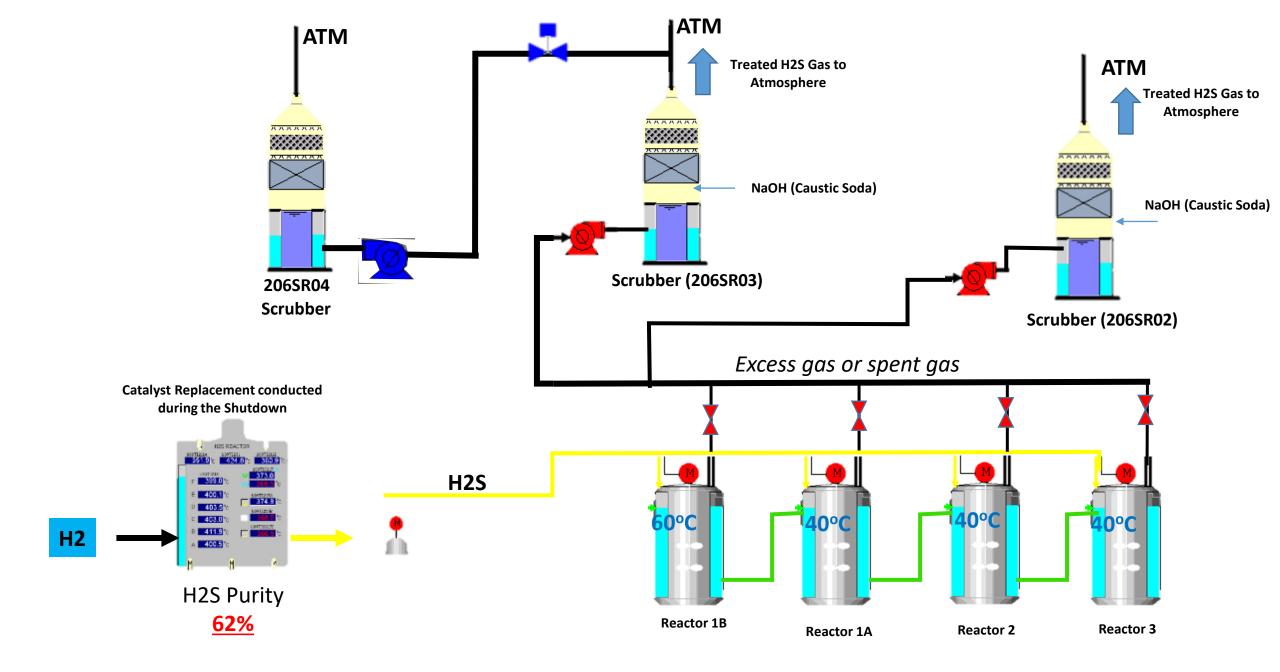


Diagram 1: During Batch Reaction

Other related information:

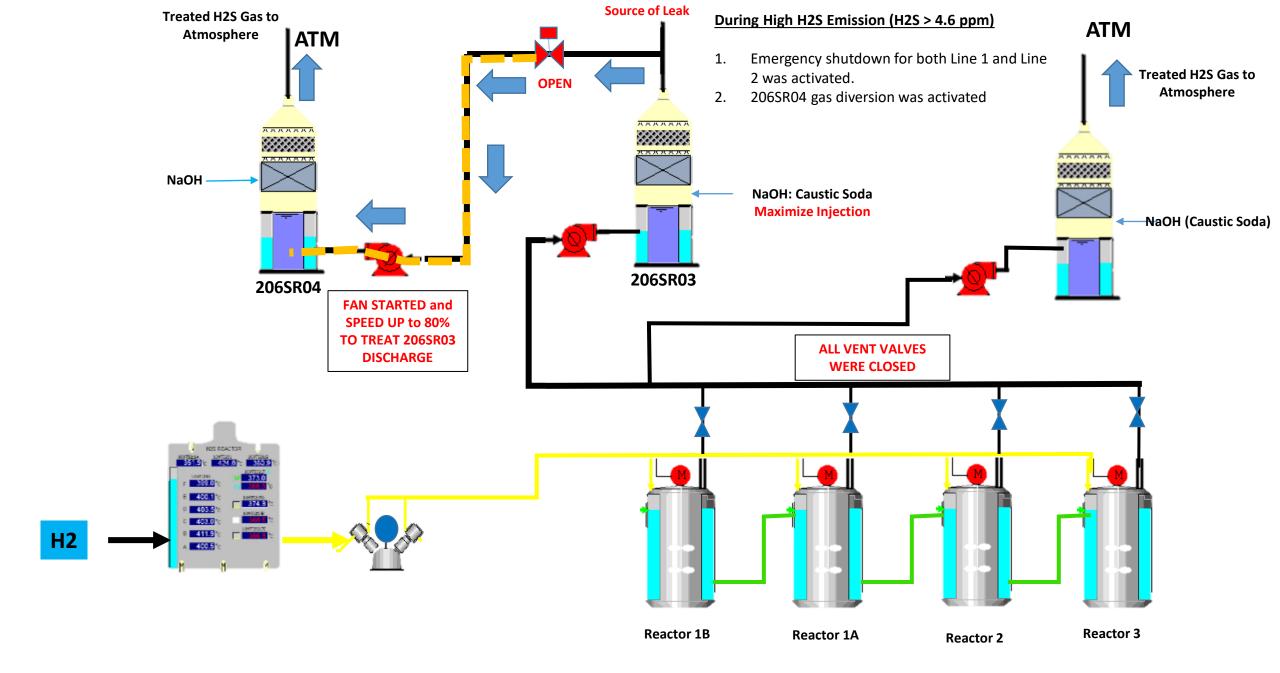
- 0022H- 0032H Border Detection was observed (3 Detectors). Triggered the Emergency Shutdown of Line-1 and 2 Sulfurization Plant.
- High reading (H2S > 4.6 ppm) indication of 206AI013/013B (206SR03 CEMS)
- Back up Scrubber (206SR04) was automatically activated during the incident. Redundant Safety feature to prevent release of H2S gas.

Probable Cause:

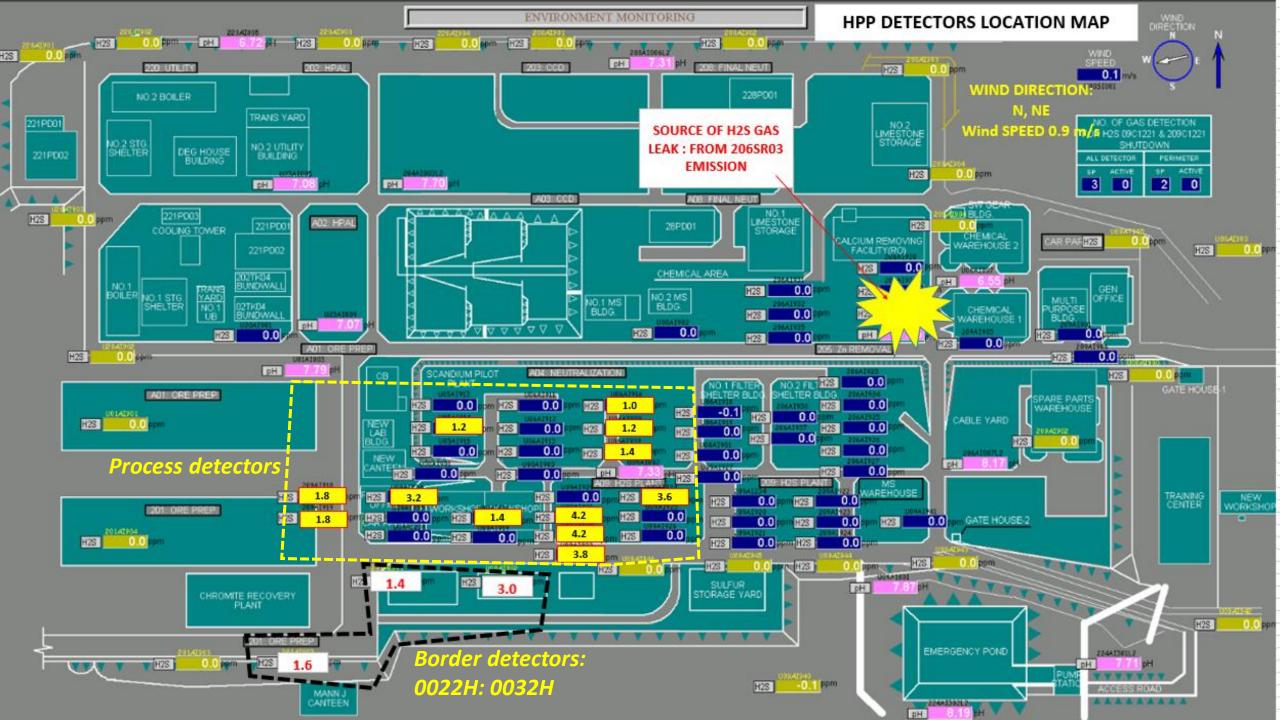
Vented excess H2S gas during the batch reaction exceeded the capacity of 206SR03 to treat H2S gas.

Immediate Action

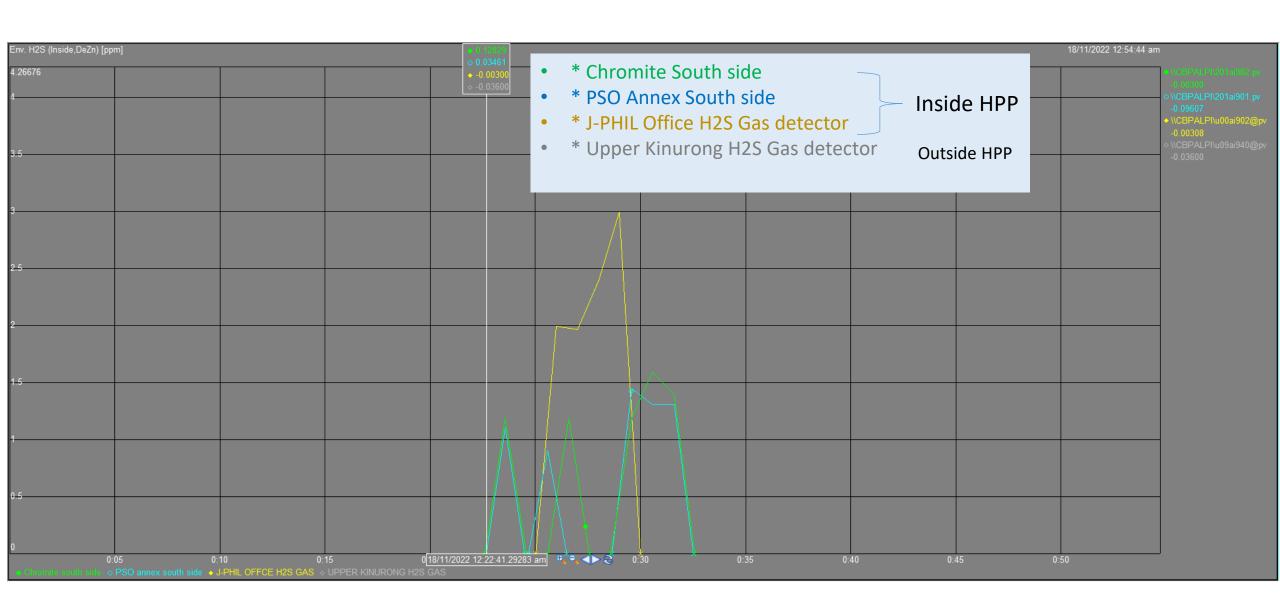
- Immediately close all vent valves (manual/control) at MS Reactors going to Scrubber (206SR03)
- Standby the activity at R2211, H2S gas purity adjustment
- Increased Caustic (NaOH) injection flow rate to Scrubber (206SR03)
- Advised CBNC personnel, contractors and sub-contractors at the affected area to wear H2S gas respirator and proceed to Evacuation Area A.
- Safety personnel proceeded outside, Southside of the plant to confirm H2S reading using portable H2S Detector.

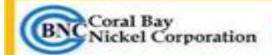






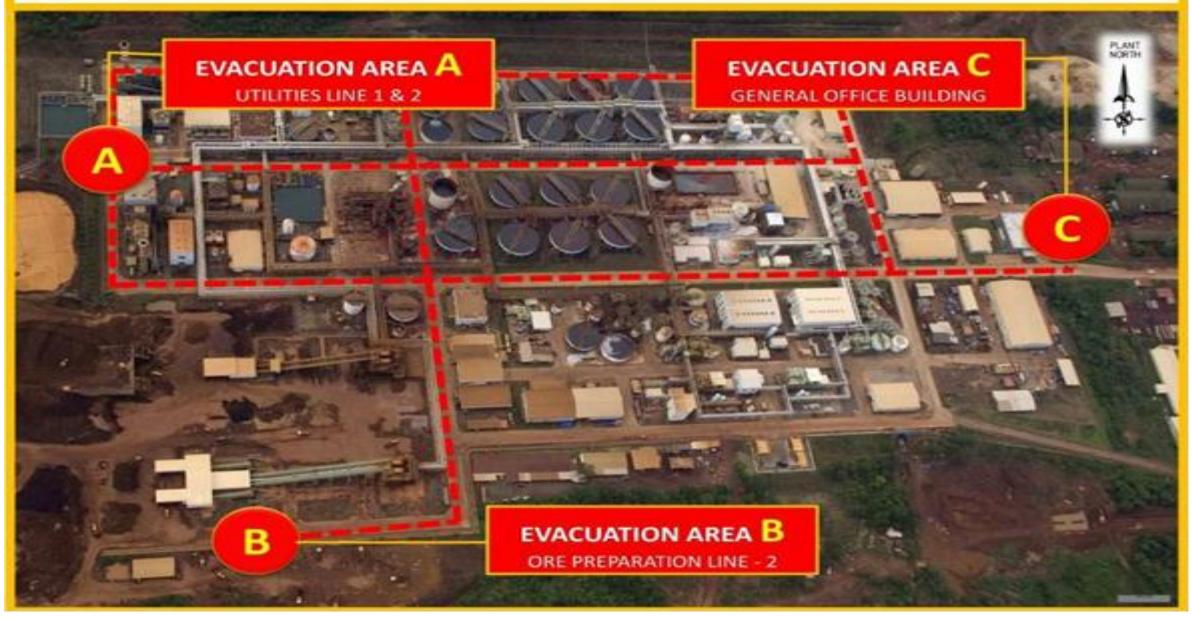
Trend 1: Data logs of 3 border detectors





EMERGENCY EVACUATION AREAS





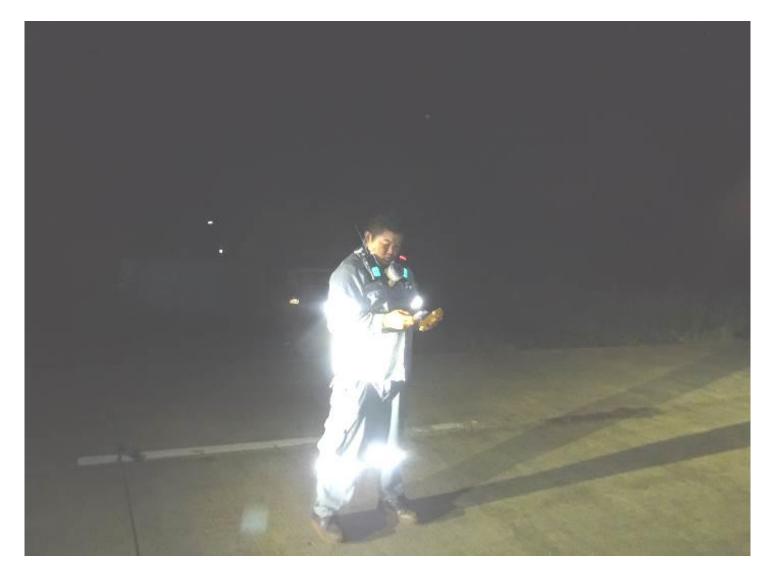








Assembly and Evacuation of Personnel to Evacuation Area A





Conducted Monitoring South of the Plant (Gamayon Area)

Corrective Action to Prevent Recurrence:

- 1. Review of the Start-up procedure and education to all personnel with focus on prevention of H2S leak.
- 2. Formulated special instruction and checklist and point out potential source of H2S leak.
- 3. Provision of lock to manual vent valves with instruction on its operation.

Countermeasure: 3

Implement Lock Out Tag- Out on vent valves, key control by Planner with approval by Production Manager with signage installation - **COMPLETED**



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