Learning from Incidents
Safety Alert from Safety Engineers Association (SEA)

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Title: Chlorine Leakage

What Happened

A chlorine dosing line was to be flushed, so that the damaged NRV (Non-Return Valve) is changed. The line was flushed for 30mins with water. After that two technicians entered with a booster pump room to replace the damaged non-return valve with cartridge respirators. When loosening the non-return valve flange, the water in it dripped & it caused the alarm from the sensor which is located below the NRV. The water contained 1ppm or more chlorine - so the alarm blowed. Immediately the technicians closed the valve and came out of the room. The line flushing was further carried out and after ensuring 0 ppm, the work was reinstated.

What went wrong

Immediate Cause:

- Assumed that half an hour flushing is enough to clear the line.
- Loosening the NRV without checking the chlorine level at the end of the line

Root Causes:

- Risk due to chlorine leakage was not envisaged during the formal risk assessment

Lessons Learnt

Flushing Chlorine:

- Volume of pipe is around 0.25m3. Pump used for flushing was 13 m3/ hr (0.003 m3/sec). Time required to flush the line would be around 1min; But in this case the flushing was done for 30 minutes. Still traces of chlorine were present. Reason was the gas is to be cleared using another gas not water (which is another medium). Hence the residual trapped gas was not removed, or 100% removal cannot be ensured. Chlorine should be removed using nitrogen.

Ensuring "0" ppm:

- Before opening the valves ensure there is no presence of gases using gas detectors (i.e.,0 ppm) - in this case at the end of the pipe the testing should be carried out.

Use of Air supplied respirator:

- For Hazardous gas locations like Chlorine or H2S only air supplied respirators or SCBA is advisable not cartridge mask.

Properties of Chlorine Gas

PEL-TWA	1 ppm
Hazards	Health Hazards ➢ If inhaled causes fatal ➢ Corrosive if falls on skin or eye

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