A Safety Alert can consist of any type of health, safety & environment (HSE) notification or Near Miss/Near Hit alert. Proactive Alerts on jobs well done are also encouraged.

**WHAT HAPPENED:**

While a rig was quayside undergoing reactivation activities, deadly hydrogen sulfide (H2S) concentrations were encountered within the bilge water tank in the machinery space. After the top hatch of the tank was removed, large concentrations of H2S escaped out into the immediate surrounding atmosphere posing high risk to personnel.

100 PPM of H2S is considered Immediately Dangerous to Life and Health (IDLH). H2S concentrations over 1,000 PPM can cause immediate collapse with loss of breathing, even after inhalation of a single breath. This corrosive gas can pit and corrode steel, which can also affect the integrity of cargo containment systems and hull structures. H2S is a highly flammable/explosive gas with a concentration in the air between 4.3% (Lower Explosive Limit) and 45% (Upper Explosive Limit).

**EFFECTS OF H2S EXPOSURE**

- **ODOUR**
  - Distinctive "rotten-egg" odour

- **IRRITATION**
  - Severe irritation of eyes and breathing passages, cough, headache, nausea, loss of sense of smell

- **IMPAIRMENT OF NERVOUS SYSTEM**
  - Difficulty breathing, fluid in lungs, vomiting, dizziness, loss of coordination
  - Stumbling, staggering, collapse or "knockdown", loss of coordination
  - Death within minutes due to respiratory paralysis

Contributing Factors

H2S was generated within the bilge water tank by Sulfate Reducing Bacteria (SRB) which thrives in low-oxygen water and sludge that is mildly caustic to acidic (pH 8 to 5) with optimum temperature around 30°C (86°F). Critical nutrients for H2S production are sulfates, phosphates and carbon.

Seawater and biodegradable cleaning agents are sources of both biological and sulfate nutrients and were associated with increased SRB H2S production.

LESSONS LEARNED:

The company undertook a review of its confined spaces and identified those with potentially high H2S concentrations and require respiratory protection when breaking the containment of these spaces unless gas content can be measured prior to opening them.