



KISH P & I LOSS PREVENTION CIRCULAR KPI-LP-149-2014
(Safety Alert concerning Dangers existent during Sampling of Cargo Tanks)

► **The issue:**

This safety alert is issued to remind the maritime community of potential dangers during sampling of cargo tanks. During a recent Port State Control (PSC) tank vessel examination, a Coast Guard member was exposed to a dangerous concentration of Hydrogen Sulfide (H₂S) gas and suffered a serious injury.

The exposure occurred during a tank vessel exam onboard a tank vessel carrying Grade E Sour Crude. A PSC team requested a ship's crew member to check cargo tank oxygen levels using the ship's portable gas meter. The crew member accessed the cargo tank via a deck sounding valve. When the valve was opened the pressurized cargo tank atmosphere escaped releasing inert gas and H₂S vapours.

During the evolution the personal gas meters of two individuals involved (one Coast Guard and one crew) alarmed for H₂S. The CG officer whose alarm sounded was standing 1-2 feet downwind from the sounding valve. Within days the CG officer developed severe exposure symptoms consistent with H₂S exposure. The other two CG officers involved were standing upwind. Afterward, one reported experiencing a minor headache.

► **The dangerous gas:**

H₂S is a colorless, flammable gas with a "rotten egg" smell that occurs naturally in crude petroleum. Even at low concentrations; this heavier-than-air gas can irritate the eyes, nose, throat and respiratory system with effects delayed for hours or days. At higher

concentrations, nausea, vomiting, headaches, dizziness, unconsciousness or death may occur. While the initial "rotten egg" odour is present, an individual may lose the ability to smell that gas after becoming exposed. Personal monitoring equipment is, therefore, vital to protect against exposure. An alarm on H₂S constitutes an acute exposure and should trigger immediate evacuation and initiation of acute exposure procedures including medical attention.

► **The advice:**

Prior to using portable gas monitoring equipment, personnel should familiarize themselves with ISGOTT Section 11.8 and safe work practices for conducting or witnessing these tests.

ISGOTT recommends when sampling tanks personnel should stand perpendicular to the wind to avoid being downwind or upwind and creating eddies. When monitoring cargo tank atmospheres, all personnel should exercise diligence and great care. In all cases, personnel should completely assess the risks, to include the cargo type, tank pressure, venting arrangements, wind direction/speed and condition of the testing equipment. When H₂S is suspected to be present, ISGOTT Section 2.3.6.5 recommends that a self contained breathing apparatus (SCBA) be worn if it is necessary to breach the integrity of the cargo system and if a vapor free atmosphere cannot be guaranteed.

EFFECTS OF H₂S

Concentration	Reaction
100 ppm	Coughing, eye irritation, loss of smell after 2-5 min
200 ppm	Marked eye and respiratory tract irritation after 1-hr exposure
500 ppm	Loss of consciousness and possibly death in 30 min to 1 hr
700 ppm	Rapid unconsciousness, cessation of breathing, and death
1,000 ppm	Unconsciousness with early cessation of breathing and death in a few minutes even if removed to fresh air at once

It is important to know that "The American Conference of Governmental Industrial Hygienists" recently reduced the H₂S dangerous Threshold Limit Value from 2 parts per million (ppm) to 1 ppm.

- ✓ As a result it is strongly recommended that those involved in cargo tank sampling or atmosphere testing:
- ✓ Be familiar with and adhere to ISGOTT safe work practices.
- ✓ Assess personnel risks.

- ✓ Don appropriate personal protection equipment including gas monitoring detectors, respirator or SCBA.

- ✓ If gas monitoring detectors are used ensure:

- Detectors are maintained and properly calibrated
- Zero alarm settings values are properly set

- ✓ Be aware and familiar with the hazards of the cargos involved as well as exposure indicators and emergency response procedures.

