Great Western Painting

Gas Hazards

Gas Hazard Awareness

In any facility in which our employees may have potential exposure to gas hazards such as oxygen deficiency; oxygen or nitrogen enrichment; carbon monoxide; and/or hydrogen sulfide, training will be given to ensure that these hazards are understood.

This Gas Hazard Awareness training will be given before initial assignment and annually thereafter.

Gas Hazard Awareness training will include the general characteristics carbon monoxide and hydrogen sulfide, as well as oxygen deficient and oxygen enriched atmospheres, below:

Carbon Monoxide

PHYSICAL STATE; APPEARANCE: ODOURLESS, TASTELESS, COLOURLESS COMPRESSED GAS. **PHYSICAL DANGERS:** The gas mixes well with air, explosive mixtures are easily formed. The gas penetrates easily through walls and ceilings. **CHEMICAL DANGERS:** May react vigorously with oxygen, acetylene, chlorine, fluorine, nitrous oxide. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 25 ppm as TWA BEI issued (ACGIH 2006). MAK: 30 ppm 35 mg/m³ Peak limitation category: II(1); Pregnancy risk group: B; (DFG 2006). OSHA PEL†: TWA 50 ppm (55 mg/m^3) NIOSH REL: TWA 35 ppm (40 mg/m^3) C 200 ppm (229 mg/m^3) NIOSH IDLH: 1200 ppm	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation. **INHALATION RISK:** A harmful concentration of this gas in the air will be reached very quickly on loss of containment. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance may cause effects on the blood , resulting in carboxyhaemoglobinemia and cardiac disorders Exposure at high levels may result in death. Medical observation is indicated. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the cardiovascular system and central nervous system May cause toxicity to human reproduction or development.	**PHYSICAL PROPERTIES** Flash point: Flammable Gas Auto-ignition temperature: 605°C Explosive limits, vol% in air: 12.5-74.2 Boiling point: -191°C Melting point: -205°C Solubility in water, ml/100 ml at 20°C: 2.3 Relative vapor density (air = 1): 0.97

Hydrogen Sulfide

PHYSICAL STATE; APPEARANCE: COLOURLESS COMPRESSED LIQUEFIED GAS , WITH CHARACTERISTIC ODOR OF ROTTEN EGGS. **PHYSICAL DANGERS:** The gas is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated. **CHEMICAL DANGERS:** Heating may cause violent combustion or explosion. The substance decomposes on burning producing toxic gases (sulfur oxides). Reacts violently with strong oxidants, causing fire and explosion hazard. Attacks many metals and some plastics. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 10 ppm as TWA 15 ppm as STEL (ACGIH 2004). MAK: 5 ppm 7.1 mg/m³ Peak limitation category: I(2) Pregnancy risk group: C (DFG 2006). OSHA PEL†: C 20 ppm 50 ppm 10-minute maximum peak NIOSH REL: C 10 ppm (15 mg/m^3) 10-minute NIOSH IDLH: 100 ppm	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation. **INHALATION RISK:** A harmful concentration of this gas in the air will be reached very quickly on loss of containment. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes and the respiratory tract The substance may cause effects on the central nervous system Exposure may result in unconsciousness. Exposure may result in death. Inhalation of gas may cause lung edema The effects may be delayed. Medical observation is indicated. Rapid evaporation of the liquid may cause frostbite.	**PHYSICAL PROPERTIES** Boiling point: -60°C Melting point: -85°C Solubility in water, g/100 ml at 20°C: 0.5 Relative vapor density (air = 1): 1.19 Flash point: Flammable Gas Auto-ignition temperature: 260°C Explosive limits, vol% in air: 4.3-46

An atmosphere that is less than 19.5% oxygen is oxygen deficient and this can easily occur in a confined space. It is caused by:

Consumption: oxygen is used up by the person who is a confined space and turned into carbon dioxide.

Displacement: denser materials push the oxygen out of a the occupied space.

Reaction: oxygen is reacted with other materials to make other compounds

An oxygen enriched atmosphere is one that exceeds 23.5 percent oxygen by volume. Oxygen enriched atmospheres are particularly hazardous due to their higher risk of flammability.

The actual gas monitoring equipment (both fixed and portable) and locations of alarm stations would be dependent [each facility would be unique] on the facility at which our employees are working as would the need for SCBA equipment.

Evacuation procedures dictated by specific gas hazard events would also fall under the provisions of the Gas Hazards Awareness training **provided by the facility** at which our employees are working.

All gas hazard awareness training will be documented and after completion of training a sticker will be affixed to employee's hard hats indicating that gas hazard awareness training has been accomplished and is current (it must be repeated annually).

Employees will use a personal portable gas detector in all high gas hazard areas. These gas monitors will be calibrated per the manufacturer's recommendations and have a current calibration sticker on the monitor which includes the date of calibration.

Daily bump tests will be performed to ensure proper gas flow and to ensure the calibration of the sensor is correct and that the alarms work and are properly set.

Our respiratory protection program, prepared in accordance with 29 CFR 1910.134, is found in Section III of our Safety Program.

Combustible Gas Indicators

The below information is extracted from OSHA Hazard Information Bulletin, dated, January 18, 1990., subject: *The Use of Combination Oxygen and Combustible Gas Detectors*.

In tank removal operations, it is common practice to purge a tank containing flammable vapors with either carbon dioxide or an inert gas, such as nitrogen. When the oxygen content falls to about 10% or below, a false combustible gas indicator reading can occur.

The combination oxygen and combustible gas meter is used to test atmospheres for sufficient oxygen content for life support and/or the presence of combustible gases or vapors posing a potential flammability/ explosion hazard. Common examples of locations where this instrument is used include storage tanks, confined spaces, manholes, tank cars, ships and shipyards, tunneling, pumping stations and hazardous waste sites.

The combustible gas indicator is designed to measure combustible gas or vapor content in air. This instrument is capable of detecting the presence

of any gas or vapor which, when combined with oxygen in free air, presents a potential hazard due to flammability/explosion. The combustible gas indicator will not indicate the combustible gas content in atmospheres containing less than 10% oxygen.

Each instrument has its own set of operating procedures and instructions, however:

a. The instrument should not be used where the oxygen concentration exceeds that of fresh air (oxygen enriched atmosphere) when sampling for gases like acetylene and hydrogen.
b. Certain materials such as silicon, silicates (such as in certain hydraulic fluids) and organic lead (such as in leaded gasoline) will poison the combustible gas sensor thereby giving erroneously low readings.
c. Combustible gas readings, either negative or greater than 100% LEL, may indicate an explosive concentration of gas beyond the accurate response range of the combustible gas sensor.
d. Pressurized or low pressure samples will give erroneous oxygen percent readings.
e. Acid gases, such as carbon dioxide, will shorten the service life of the oxygen sensor.
f. The instrument will not indicate the presence of combustible airborne mists or dusts such as lubricating oils, coal dust or grain dust.

The safe and effective performance of any oxygen/combustible gas detector requires that the operator know the correct use of the instrument to detect explosive concentrations of combustibles. It is important that the instrument response be appraised in light of the limitations and guidelines given in the instrument manual. The instrument should be operated only after the instructions, labels, cautions and warnings, and any other literature accompanying the instrument are carefully read and understood.

Prior to actual work, our employees will receive training in the Owner's contingency plan which would include evacuation routes, alarms, and rescue procedures. Our employees will participate in emergency evacuation drills and practice rescue procedures.

Lastly, on the following page, is information on Carbon Monoxide Poisoning extracted from Volume III our out Project Site Safety Meetings

CARBON MONOXIDE POISONING

On the job site, the main sources of carbon monoxide (CO) poisoning are running an internal combustion engine indoors, running an internal combustion engine outdoors adjacent to the building ventilation system intake, and, of course, furnaces.

Carbon monoxide is odorless, tasteless, non-irritating -- and lethal. As a worker is exposed to more and more amounts of CO, his ability to save himself is impaired because its effects “sneak-up” and produce not only weakness, but confusion. It is easy to assume that, because you have worked in the presence of CO in the past that you can continue to do so in the future.

Imagine a sealed space a little larger than 20’X20’X20’. A 5.5-horsepower, gasoline-powered pressure washer operated within this space would produce concentrations of CO reaching 200 ppm within 5 minutes and 1,200 ppm (the immediately dangerous to life and health level) within 15 minutes. Remember that the OSHA permissible exposure limit (PEL) for CO is 50 ppm as an 8-hour time-weighted average (TWA).

The severity of symptoms of CO exposure is influenced by three main factors:

a. the concentration of CO in the environment.

b. how long the exposure lasts.

c. work-load and breathing rate.

Assuming that workers have a moderate level of activity during exposures to CO, the following symptoms may present themselves:

Exposure	Duration	Symptoms
80-100 ppm	1-2 hours	can result in decreased exercise tolerance and, in persons who are at risk, may bring on chest pain and cause irregular heartbeat
100-200 ppm	1-2 hours	headache, nausea, and mental impairment
over 700 ppm	over 1 hr	more serious central nervous system effects, coma, and death

CO combines with the hemoglobin in the blood and forms carboxyhemoglobin which prevents the red blood cells from picking up oxygen in the lungs and transporting it to the tissues within the body including the brain.

For mild exposure, first aid involves getting a worker to fresh air. More serious first aid includes CPR and administration of pure oxygen by a first aid provider. Persons exposed to CO should never drive an automobile to a hospital -- they should be transported.