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I. PURPOSE

The purpose of this program is to establish minimum requirements for site specific H2S safety, which will enhance safety in the occupational setting where hydrogen sulfide is present or is recognized as being potentially present.

II. SCOPE

This program sets forth accepted practices for Hydrogen Sulfide (H2S). This program applies to all employees of Gallant Builders (Gallant), temporary employees, and any contractors working for Gallant. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers Gallant employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

III. DEFINITIONS

- **Contingency Plan** - a site-specific written document that provides an organized plan for alerting and protecting the public within an area of exposure following the accidental release of all potentially hazardous atmospheric concentrations of hydrogen sulfide.
- **Exposure Level** - permissible exposure level of hydrogen sulfide is 10 PPM for an 8-hour, time weighted average.
- **Gas Detector Instrument** - An instrument/detector to measure levels of H2S. Instruments may be electronically or manually operated.
- **Hydrogen Sulfide (H2S)** - is an extremely deadly, toxic gas that in its pure state is colorless and is heavier than air. Additionally:
    1. It is the second most toxic gas known to man, ranking behind hydrogen cyanide and ahead of carbon monoxide.
    2. It has the odor of rotten eggs at low concentrations.
    3. In higher concentrations rapidly paralyze the olfactory nerves (sense of smell).
    4. Is soluble in water and is flammable and poses a definite threat of explosion.
- **Parts Per Million (PPM**) - parts of vapor or gas per million parts of contaminated air by volume.
- **Personal H2S Monitor** - An electronic instrument worn on the person that is set to alarm at 10 PPM of H2S.
- **Possible Locations of H2S** – While clients are required to notify Gallant of known H2S locations the majority of time H2S can be located in drilling operations, recycled drilling mud, water from sour crude wells, blowouts, tank gauging, during routine field maintenance involving hydrocarbons, tank batteries and wells.
- **Venting** - the process of discharging a material to the atmosphere through a series piping and/or venting devices, to facilitate the proper and safe dispersion of toxic materials and to minimize personnel exposure.

IV. KEY RESPONSIBILITIES

MANAGERS AND SUPERVISORS

- Shall ensure all employees who are to be assigned to work at locations where hydrogen sulfide is known to be present, or suspected to be present in any concentration, have been trained in hydrogen sulfide safety.
- To ensure employees have been medically approved to wear respirators and trained on the safe use of respirators, including a respirator fit test in accordance with Gallant's Respiratory Protection Program.
- To ensure employees have been trained and familiar with personal H2S monitors and gas detection instruments.
- To have been provided with the client's safety procedures.
- To ensure the necessary respiratory equipment to perform the work safely is available.
- That each employee has been provided with a copy of this program.

EMPLOYEES

Employees are responsible to comply with this program.

V. PROCEDURE

PHYSICAL AND HEALTH EFFECTS OF HYDROGEN SULFIDE

- H2S paralyzes the sense of smell. Do Not Rely On Smell To Detect H2s – Rely Strictly On Instruments Designed To Measure Concentrations Of H2s.
- Hydrogen sulfide is a very dangerous and deadly gas - it is colorless and heavier than air.
- It can accumulate in low places and in small concentrations it has a strong, pungent, somewhat distasteful odor similar to rotten eggs. In higher concentrations, it can deaden the sense of smell (olfactory nerve).
- Exposure to certain concentrations of H2S can cause serious injury or death.

TOXIC EFFECTS OF HYDROGEN SULFIDE

CONCENTRATION	PHYSICAL and HEALTH EFFECTS
.01 PPM	Can smell odor.
10 PPM	Obvious and unpleasant odor. Beginning eye irritation. ANSI permissible exposure level for 8 hours (enforced by OSHA).
100 PPM	Immediately Dangerous to life or Health (IDLH) Kills smell in 3-15 minutes; may sting eyes and throat. May cause coughing and drowsiness. Possible delayed death within 48 hours.
200 PPM	Kills smell shortly, stings eyes and throat. Respiratory irritation. Death after 1-2 hours exposure.
500 PPM	Dizziness; breathing ceases in a few minutes. Need prompt rescue breathing (CPR). Self-rescue impossible because of loss of muscle control.
700 PPM	Unconscious quickly; death will result if not rescued promptly. 1000 PPM Unconscious at once, followed by death within minutes.

VI. GENERAL

Gallant should have a written confined space program per 29 CFR 1910.146 and employees should be trained

under CF 1910.146(g) and Gallant employees will be aware of owners contingency plan provisions.

Each person entering a H2S designated location, regardless of the concentration, shall wear a personal H2S monitor that is set to alarm at 10 PPM and shall carry a 5-minute escape pack with them at all times.

When work requires opening any equipment on location that has the potential of releasing concentrations of H2S at 100 PPM or higher, two or more H2S trained persons shall be present and follow these procedures prior to and during the opening of the equipment:

- Each person entering the H2S location shall don a personal H2S monitor prior to entry.
- A tailgate meeting will be held with everyone on location to discuss the work plan, the responsibilities of each person and the site specific contingency plan.
- Each person shall have either a self-contained breathing apparatus (SCBA) or a supplied airline respirator equipped with a 5-minute escape pack, and shall be worn when opening the equipment to the surrounding atmosphere.
- When the H2S alarm sounds employees must evacuate the area or don their SCBA or supplied airline respirator.
- At least one person (per two workers), equipped with a SCBA will act as a stand-by person and may not participate in the work being performed until the atmosphere has been tested and found to have no H2S present in quantities over 10 PPM. The stand-by person shall be stationed up wind, within 100 feet and in clear view of the workers.
- If an operator or other third party provides the stand-by person, it will be the responsibility of the Gallant manager/supervisor in charge to verify that the person has been H2S, CPR, and First Aid trained, and that they have been provided the proper respiratory equipment.

    1. Only Gallant employees may wear Gallant respirator equipment.
    2. If Gallant employees will use client or other third party equipment, the equipment must be inspected to ensure it is safe to use and meets Gallant's requirements.

- After the equipment has been locked and tagged out (per Gallant Lockout/Tagout Program), opened and the H2S concentration has been cleared to less than 10 PPM, the stand-by person will no longer be required. Work may then be performed without respiratory equipment, except for the required 5-minute escape pack.

VII. SAFE WORK PROCEDURES

- Maintain compliance with permit requirements of Gallant and any requirements by the client.
- Verify that proper safety equipment is available, functioning properly and is utilized.
- Check and remain aware of wind conditions and direction.
- Perform a thorough check of the downwind area prior to the start of any potentially hazardous work activity.
- Check for other personnel and ignition sources.
- Ventilate work areas by venting and purging lines and vessels prior to beginning any work activities.
- Keep all non-essential personnel away from work areas.
- Immediately vacate the area when any H2S monitor sounds and do not re-enter without proper respiratory protection.

VIII. EQUIPMENT

The following equipment shall be provided and used as required by this program:

- Personal H2S monitor set to alarm at permissible exposure limit of 10 PPM for OSHA 1926 requirements and 20 PPM for OSHA 1910 requirements. Fixed monitors may be present as well at the same alarm setting.
- Portable H2S gas testing instrument, either electronic or manual pump operated, capable of testing the suspected concentrations of H2S in the system.
- Each testing instrument must be capable of testing the suspected concentrations of H2S by using the manufacturer's recommended calibrated tube or other means of measuring the concentration of gas.
- Testing instruments shall be calibrated periodically according to the manufacturer's recommendation, and at least annually.
- Calibration kits with regulator for calibrating the personal monitor.
- Calibration gas cylinder for testing the personal monitor.
- NIOSH-certified self-contained breathing apparatus (air pack) with a minimum of a 30-minute air supply or airline respirator with escape SCBA should be used.
- Full face, air supplied, positive pressure hose line respirator, with 5 minute escape pack attached.
- Respirator wearers requiring corrective eyewear will be fitted with spectacle kits according to the respirator manufacturer, at no expense to the employee.
- Respirators and their components, including all fittings of hoses, shall not be interchanged, which if done, would violate the approval rating of said respirator or related equipment.

IX. MEDICAL

Each employee shall have completed a medical evaluation by a physician or licensed health care professional to determine the employee's ability to wear a respirator as required by the Gallant Respiratory Protection Program.

Each employee will successfully complete the medical questionnaire and examination before being allowed to be fit tested with a respirator.

X. TRAINING

Employees required to work on H2S locations will be trained. Training shall consist of:

- Physical and chemical properties of H2S
- Sources of H2S
- Human physiology
- Signs and symptoms of H2S exposure, acute and chronic toxicity
- Symptomatology of H2S exposure
- Medical evaluation
- Work procedures
- Personal protective equipment required working around H2S
- Use of contingency plans and emergency response
- Burning, flaring, and venting of H2S
- State and federal regulatory requirement
- H2S release dispersion models

- Rescue techniques, first aid, and post exposure evaluation
- Use, care, and calibration of personal monitors and gas detection instruments
- Respirator inspections and record keeping

Each respirator wearer will complete Respiratory Protection training and a Respirator Fit Test, after being given a medical clearance and before entering any H2S location.

Employees and other personnel visiting H2S locations who will not be involved in the work shall be briefed on the following prior to entering:

- Site-specific sources of H2S
- Health hazards of H2S
- Routes of egress
- Emergency assembly areas
- Applicable alarm signals and
- How to respond in the event of an emergency.

XI. RESCUE

Each employee, when working alone in a H2S designated area, shall plan and become familiar with self-escape procedures to include being aware of wind direction and obstacles to avoid when exiting the work area.

Employees working under the buddy system shall pre-plan an emergency rescue and/or evacuation procedure prior to commencing work, and arrange for periodic communications with his/her supervisor, and document the discussion on each employee's service report.

XII. RESPIRATOR INSPECTIONS

Respirators will be inspected by the employee before each use and at least monthly.

The inspection will include the respirator face piece, hose, harness, 5minute escape pack cylinder and all other components of the air supply systems used.

Monthly inspections will be documented as per Gallant Respiratory Protection Program, and will be kept on file at the local office for review during safety audits.

XIII. MONITORS AND GAS DETECTOR CALIBRATION

Each personal H2S monitor shall be calibrated at least monthly and the results recorded on the calibration log.

Those monitors that do not require calibrating shall be bump checked with calibration gas to test alarms, monthly or prior to use if not used routinely.