H2S Safety Procedure

Document Authorization

<table>
<thead>
<tr>
<th>Document Type</th>
<th>Security Classification</th>
<th>Document Authority/Owner</th>
<th>Document Custodian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Procedure</td>
<td>Unrestricted</td>
<td>P.O.G.C</td>
<td>HSE</td>
</tr>
</tbody>
</table>

Document Author

<table>
<thead>
<tr>
<th>Document Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSE-S564392</td>
</tr>
<tr>
<td>HSE-S593443</td>
</tr>
</tbody>
</table>

Approved By

<table>
<thead>
<tr>
<th>Approved By</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.Ansari</td>
</tr>
</tbody>
</table>
# Table of contents

1- INTRODUCTION ............................................................................................................... 3
2- PURPOSE ........................................................................................................................ 3
3- SCOPE ............................................................................................................................ 3
4- RESPONSIBILITIES ..................................................................................................... 3
5- PROCEDURE ................................................................................................................... 5
   5.1 Technical Procedure .......................................................................................... 5
   5.2 Equipment .......................................................................................................... 9
   5.3 Working in H2S atmosphere ............................................................................ 10
   5.4 Rescue and Search equipment ....................................................................... 10
   5.5 Evacuation equipment ................................................................................... 11
   5.6 Works Organization ......................................................................................... 12
   5.7 Commissioning operations ............................................................................ 13
   5.8 Treatment of H2S Poisoning .......................................................................... 13
6- TRAINING ..................................................................................................................... 15
7- DEFINITIONS ............................................................................................................. 15
8- REFERENCES .............................................................................................................. 15
9- APPENDIXES ............................................................................................................. 15
SUGGESTION FORM
1. INTRODUCTION

Pars Oil and Gas Company (POGC), a subsidiary of National Iranian Oil Company (NIOC), was established in 1998. POGC is a developmental and manufacturing organization that specializes in the fields of engineering and management of development projects, production, operation and integrated management of oil and gas reservoirs. POGC’s mission is to ensure sustainable and preservative production and development of Iran’s oil and gas industry in the areas under its responsibility, development of oil and gas value chain as well as optimization of energy supply processes at national, regional and international levels. POGC is also in charge of development of joint and non-joint oil and gas fields of the country including South Pars, North Pars, Golshan and Ferdowsi.

Aimed at creating superior value and boosting the level of satisfaction of the beneficiaries and with an approach focusing on sustainable, integrated and knowledge-oriented production and development, the company feels committed to comply with national and international requirements, regulations and standards in such areas as quality, safety, as well as occupational and environmental health.

2. PURPOSE

The purpose of this procedure is to provide rules for the set up of H$_2$S locations and for the conduct on such locations, in order to ensure that the correct level of H$_2$S protection is provided during south pars phases activities and that people and environment are protected against the dangers from H$_2$S.

This procedure purpose is to inform all personnel of the hazardous nature of H$_2$S, the safety concerns during production and maintenance operations performed onshore/offshore and the precautionary measures, which are in place for South Pars Gas Field operations.

3. SCOPE

This procedure is applicable for each location where oil and gas are produced and/or treated and where presence of H$_2$S has been proven. It is equally applicable to a location where drilling takes place in a formation where gas or oil with H2S is expected to be found.

4. RESPONSIBILITIES

4.1 Site Manager

The site manager is responsible:

- For ensuring all control measures and duties regarding H$_2$S operations are strictly applied and adhered to by all personnel involved.
• To ensure that a system is in place to provide to every body who working in a sour gas area, the means to warn personnel and evacuate the zone when more than 5 ppm of H2S in the air is detected.
• To ensure that training and drills are performed satisfactorily.
• To develop a specific emergency procedure to be initiated upon manual or automatic H2S alarm initiation.

4.2 HSE Manager
The HSE manager is monitoring the safety and assisting site manager in briefing and training all personnel working on the location about: H2S dangers, the conduct, the use of escape masks, escape routes and muster point(s).
He will be responsible for ensuring that training and drills are performed satisfactorily and that a record is kept of such drills.

4.3 Operations Assistant
The Operations Assistant Phases is responsible for:
• Ensuring that a system is in place to provide the means of visually and audibly warning all personnel working in a sour gas area to evacuate the zone, when more than 10 ppm (parts per million) of H2S in the air is detected

4.4 Head of Fire fighting & Safety
• Organizing training and certification.
• The implementation of this procedure, ensuring that all personnel are informed of the danger associated with H2S, and that all training, instruction and supervision are in place so that personnel receive sufficient information on the hazards of H2S and precautionary measures.

4.5 Head of HSE / Safety Officers
• The Head of HSE and the Safety Officers are responsible for:
• Ensuring that all personnel are fully briefed and instructed in the use of personal H2S monitor and escape set.
• Ensuring that all safety equipment is fully maintained and available for use.
• Advise personnel on the ventilation procedure for confined spaces.

4.6 Permit Controller
The Permit Controller is responsible for:
• Ensuring that the correct permit formalities are addressed with regards to entry into confined spaces and where the presence of H2S is possible.

4.7 Field Supervisors
Field supervisors are responsible for:
• Ensuring that all personnel reporting to them are fully informed of the dangers associated with H2S and safety precautions in place to safeguard themselves and the facility, and how to implement this Safe Operating Procedure.
• Ensuring that themselves and their respective teams understand the Mustering and Evacuation Procedure to be followed in the event of an emergency.
• Ensuring that their team fully participates in all exercises, drills and safety training.
• Ensure that each team has the requisite number of advanced first aiders.

4.8 All Persons
All persons Offshore are responsible for:
• Their own safety and the safeguarding of the equipment and Company assets used to perform their duty.
• Understand fully and apply correctly this procedure in the course of their work.
• Do not interfere or misuse any plant or equipment, in particular anything provided for safety, health, welfare or pollution control reasons.
• Report immediately any incorrect procedure, anomaly, near miss, accident, defective equipment or tools or any hazard which comes to their attention in the course of their work or that they observe around them.
• Ensure that their personal issue H2S Detector and emergency escape unit is operational and carried with them at all times.

5. PROCEDURE:

5.1 Technical Procedure :
Hydrogen sulphide, H2S, is produced by the bacterial decomposition of vegetable and animal matter that contains sulphur. It is formed in some types of crude oil “sour crude” over many millions of years and often found in the production and refining of high sulphur petroleum and natural gases. Hydrogen sulphide is also found in stagnant waters, marshes, sewers and mines.
At low concentrations hydrogen sulphide has a strong and unpleasant odor of rotten eggs. A concentration as low as one part H2S is in a million parts of air may be smelt. At slightly higher concentrations H2S may have a sticky-sweet odor. Hydrogen sulphide is also:
• Colorless
• Extremely toxic
• Flammable
• Heavier than air, specific gravity 1.19
There is therefore a major safety concern during production and maintenance operations performed onshore/offshore in the Assalooyeh plant.

5.1.1 Nature and Effects of Hydrogen Sulfide:
When inhaled, hydrogen sulphide passes from the lungs into the bloodstream. In low doses, hydrogen sulphide is readily oxidized and the by-products excreted without any obvious or adverse health effects. As the concentration of hydrogen sulphide is increased, the intake of H2S is greater than the metabolism rate and adverse health effects commence.
Hydrogen sulphide is irritating to the eyes and respiratory tract and has narcotic effect on the nervous system. Irritation to the eyes may cause severe pain and incapacitate the worker. At higher concentrations; hydrogen sulphide is odorless due to the phenomenon of olfactory fatigue, i.e., loss of sense of smell. Several fatalities have occurred due to respiratory paralysis following the erroneous belief that “no odor” means “no gas.”

Exposure to hazardous materials must be known and controlled or personnel may suffer a permanent health effect, possibly death. It is unacceptable to allow yourself or another person to be exposed to a concentration of hazardous material that may result in a permanent health effect. An unacceptable exposure to a hazardous material will occur if the exposure is not within he parameters determined by the exposure limits. These exposure limits are more commonly known as threshold limit values.

5.1.2 H2S Hazards and Symptoms

Extremely toxic (almost as toxic as Hydrogen Cyanide) and 5 to 6 times as toxic as Carbon Monoxide, H2S can be only smelt at low concentrations (1-50 ppm). Beyond 50 ppm, the sense of smell is lost after about 15 minutes exposure.

Therefore DO NOT DEPEND ON SMELL TO DETECT H2S.

H2S is irritating, asphyxiating and very poisonous. It irritates the eyes and throat at low concentrations (30-150 ppm). At 500 ppm it causes dizziness and unconsciousness within 20 minutes.

Concentrations of 1,000 ppm of H2S cause immediate unconsciousness and death quickly follows unless artificial respiration and/or oxygen treatment is promptly applied (see table 1 of H2S toxicity). Death may occur even if the individual is removed to fresh air at once.

H2S poisoning is not cumulative like mercury, lead or radioactivity. Repeated short exposures will not have same effect as one lengthy exposure.

It must be noted that the values listed in the table 1 are approximate for the “average” person. Individual responses will vary according to:

- Frequency of exposure
- Duration of exposure
- Intensity of exposure
- Age
- Fitness and health
- Personal susceptibilities.

Consequently, these values should not be regarded as fixed but maxima. the principle when working with any hazardous material is the ALARA principles, AS LOW AS Reasonably Achievable. This does not mean trying to achieve “total safety” or ignoring the identifiable hazards; but a considered evaluation of the risk and implementing appropriate action to prevent any persons from suffering a health effect.
5.1.3 **TWA and STEL Limit for H₂S**:
- “Time Weighted Average” (TWA) up to 10 ppm = no more than 8 hours per day. (The refreshment time shall not be less than 16 hours)
- “Short Term Exposure Limit” (STEL) up to 15 ppm = Max of 4 exposures per 8 hours, but not more than 15 minutes each. (the refreshment time shall not be less than 60 minutes between each exposures)

<table>
<thead>
<tr>
<th>H₂S Concentrations (ppm, in air)</th>
<th>Effects Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-6</td>
<td>Easily detected, moderate odor.</td>
</tr>
<tr>
<td>10-20</td>
<td>Unpleasant odor. Possible eye irritation. TWA up to 10 ppm = no more than 8 hours per day. “Short Term Exposure Limit” (STEL) up to 15 ppm = Max of 4 exposures per day, no more than 15 minutes each.</td>
</tr>
<tr>
<td>50-100</td>
<td>Loss of sense of smell after about 15 minutes exposure. Irritation of throat and eyes. Altered respiration, pain in the eyes and drowsiness after 15-30 minutes followed by throat irritation after 1 hour.</td>
</tr>
<tr>
<td>100-200</td>
<td>Loss of sense of smell within seconds, with irritation of throat and eyes. Hemorrhage and death beyond 8 hours exposure.</td>
</tr>
<tr>
<td>200-500</td>
<td>Loss of balance and consciousness within 30 minutes and paralysis of the respiratory system. Artificial respiration must be applied immediately. Hemorrhage and death after 2 to 4 hours exposure.</td>
</tr>
<tr>
<td>500-700</td>
<td>Loss of consciousness within 15 minutes of exposure. Respiration stops and death is inevitable after 15 to 30 minutes exposure if the victim is not immediately treated.</td>
</tr>
<tr>
<td>700-1,000</td>
<td>Immediate loss of consciousness. Brain damage or death if first aid is not immediately applied. Inevitable death after 15 minutes exposure.</td>
</tr>
<tr>
<td>1,000-1,500</td>
<td>Immediate collapse and death after 2 minutes exposure.</td>
</tr>
<tr>
<td>Above 1,500</td>
<td>Immediate death</td>
</tr>
</tbody>
</table>
Things to remember:

- Over 0.1% in the air, unconsciousness at once with early cessation of respiration and death in few minutes. Death may occur even if the individual is removed to fresh air at once.
- H2S poisoning is not cumulative like mercury, lead or radioactivity. Repeated short exposures will not have same effect as one lengthy exposure.
- Low concentrations of H₂S hinder ability of an individual to think clearly by affecting the nervous system

5.1.4 Precautions

Escape mask with H₂S cartridges (Draeger Parat II type) will be provided for all personnel working in the area. Sufficient number of escape masks will be provided to allow personal issue for all workers. Escape masks should be used for evacuation only and not for search and rescue operation, nor for working in an H₂S environment.

Prior to any work being carried out in confined spaces and/or where the presence of H₂S is possible, work permits and entry permits shall be obtained as detailed in the following procedures:

Doc. No. PR-72-POGC-001 Entry to Vessel and Confined Spaces

Doc. No. MA-64-POGC-001 The Permit to Work System

5.1.5 H₂S effects on material

- Acid based: H₂S is highly corrosive to certain metals. Then a corrosion monitoring program should be established to detect and mitigate internal and external corrosion activity that can affect equipment in hydrogen sulfide service.
- It may form Pyrophoric Iron Sulphide scale, which is very unstable in air. On exposure to air it reverts to iron oxide (rust) and sulphur dioxide (SO₂). This reaction is often so rapid that Pyrophoric Iron Sulphide will burn (another source of ignition).

5.1.6 H₂S measuring units

- In dealing with H₂S, several units may be used for measuring its concentration.
- The most common unit used in the oil industry is the ppm (part per million) by volume (0.0001 Mol % or 0.0001 volume % = 1ppm).

5.1.7 Physical and Chemical Properties of H₂S

- Colorless, with offensive odor, often described as that of rotten eggs,
- Forms an explosive mixture with a concentration between 4.3% and 46% by volume. Auto-ignition occurs at 500°F (260°C), which is a very low ignition temperature.
- Vapors may travel a considerable distance, and flash back if they reach a source of ignition.
• Burns with a blue flame and produces Sulphur dioxide (SO₂), less toxic than H₂S but very irritating to eyes and lungs and may cause serious injury.
• Heavier than air = specific gravity 1.189: H₂S may thus collect in low areas such as moon pool, well cellars, open drain ditches, etc …
• It as been noticed, however, that H₂S could also be swept along with the produced gas and be present on high spots.
• Soluble in both water (4 volume gas in 1 volume water at 0°C) and liquid hydrocarbons.
• Corrosive to all electro-chemical series metals.
• Boiling point: -60.3°C (-76.5°F), Melting point: -82.9°C (-117.2°F).

5.1.8 Flammability

Hydrogen sulphide can form explosive mixtures in air or oxygen. The lower and upper explosive limits being 4.3% and 46.0% by volume, respectively. It burns readily with a bright blue flame to sulphur dioxide, SO₂, and water vapor. sulphur dioxide is also a very toxic gas with a pungent odor and irritating to the eyes and lungs.

5.2 Equipment

5.2.1 H₂S detection

Detection apparatus that continuously determines the presence of H₂S in the air shall be available. This detection apparatus shall provide an acoustic and visual alarm upon exceeding the set alarm limits (TWA value).

There are 3 distinctive types of detectors:

- Personal H₂S detector, which senses H₂S in the immediate vicinity of the bearer. To be worn by all persons on the H₂S site.
- Portable H₂S detector e.g. to be used to trace leaks.
- Permanently installed H₂S detectors for continuous detection.

All detection apparatus shall be checked regularly according to the guidelines of the manufacturer.

Local area Audible and Visual alarms are connected to the detector system, which also gives an alarm in the control room.

5.2.2 H₂S Detectors

5.2.2.1 Fixed Detectors

Fixed detectors are mounted around the workplace where H₂S sources are present or in areas where H₂S may accumulate. One or two sensors can be attached to each detection station. The stations are mounted in open areas and continuously monitor for H₂S in the work area atmosphere. In addition, each station may have either an audio or a visual alarm, or both.

The fixed H₂S detectors shall initiate responses at two different concentrations:
for warning alarms and for initiation of executive action

5.2.2.2 Portable Detectors

The staffs on the south pars gas field can use handheld portable detectors to spot check for the presence of H₂S. In addition, this style of detector can be used to monitor the work atmosphere.

The portable H₂S detectors shall be capable of detecting 0 - 100% LEL of H₂S. The portable H₂S detector shall have an integral audio-visual alarm. Alarm shall be adjustable over the entire detection range of gas detectors.

The portable H₂S detectors shall be battery operated, the batteries shall be rechargeable. The portable H₂S detector shall be capable of generating a "Battery Low" Alarm. The portable H₂S detectors shall also include accessories such as carrying case, aspirator, calibration adaptor, charging kit, etc.

5.3 Working in H₂S Atmosphere

For the intervention team's work in an H₂S polluted environment such as for rescue team when they want to inter to toxic and polluted atmosphere, all of team members should be trained and use of personal protective equipment are mandatory for them.

A dedicated H₂S Supervisor, who wants to train all Personnel On Board in the use of the various detection and protective equipment, will be permanently on board. Testing of protective breathing equipment shall be done at least once a week.

Air compressor(s) used to fill SCBA's or the risky situation should be able to operate on a continuous basis, and in particular the suction line of air compressor should be situated in a SAFE ZONE so as to avoid entry of contaminated air.

5.4 Rescue and Search Equipment

For the emergency teams and to allow the safe intervention of the team-mate (Buddy system) in emergency a sufficient number of sets of Self Contained Breathing Apparatus (SCBA) shall be provided at readily accessible places on the sour gas installation.

Breathing apparatus will be used at source area or in any area that has more than 10 ppm of H₂S in the air.

The use of SCBA should be strictly restricted to safety and rescue operations and not normal works, which requires the installation of a Cascade system, (i.e. rescue of people being suffocated by H₂S, measure of H₂S concentration, or any required investigation under H₂S dangerous atmosphere).

The SCBA will be of the positive pressure type, 30’ autonomy (6 l x 200 bars), and full face mask.

Testing of protective breathing equipment shall be done at least once a week.

Air compressor(s) used to fill SCBA’s or the Cascade System capacities should be able to operate on a continuous basis, and in particular the suction line of air compressor should be situated in a SAFE ZONE so as to avoid entry of contaminated air.
5.5 Evacuation equipment

5.5.1 Basic personnel equipment

Everybody entering a sour gas zone - potentially exposed to possible presence of H2S or SO2 - should be equipped with escape mask with H2S / SO2 cartridges.

Escape masks must be carried out at waists at any time during work in sites exposed to accidental H2S / SO2 gas release.

Escape masks should be used for evacuation only and not for search and rescue operation (SCBA), nor for working in an H2S environment (Cascade system).

For the maximum possible number of people on board, including visitors, 120% of escape masks nose clip type with filter and 120% of spare filters shall be provided.

5.5.2 Evacuation means

Exit ways:
Rapid evacuation routes will be provided from every working area to muster points. These routes will be maintained free from obstruction and properly marked.

- Exit way shall be specified with suitable signs and guides and adequate illuminations in order to readily and quickly of evacuation.
- Periodic drills and maneuvers shall be programmed (scheduled) and executed in order to continuous preparedness of personnel and rescue worker.

Wind:
An accurate wind forecast must be available at all times.
The wind direction must be shown by at least TWO VISIBLE WIND INDICATORS such as windsocks, pennants illuminated at night.

Muster point:
Designated muster points normally located outside the limits of the impacted area will be set up and suitably equipped with means of communication.

An accurate wind forecast must be available at all times. The wind direction shall be shown by VISIBLE WIND INDICATORS such as windsocks, illuminated at night.

Alarm system:
All sour gas installations will be provided with a dedicated general H2S alarm.
The first level of alarm should be set at 10 ppm. Explosion proof horns and flashing lights will be provided.
These visible and audible H2S related alarms shall be distinct from the installation Fire & gas and Abandon alarms, to avoid any confusion and ensure that personnel immediately don the appropriate set of protection equipment.
5.6 Works Organization

5.6.1 Rules for Access

Access to the production areas is only allowed with the approval of the Area Manager or his delegate.

To get access to the location, the following conditions are set

- Each person needs to be briefed about the dangers of H2S, the use of the escape mask and other breathing protection as well as how to act in case of alarm.
- Breathing protection ready for use shall be available within hand reach; this is at the minimum an escape mask. Before entering the location, the expiry date on the use of the escape mask shall be checked.
- Activities whereby compressed air breathing apparatus is required shall be performed by a group of at least two persons.

5.6.2 Permit to Work

Activities other than normal routine work on the location (or parts thereof) may only be performed when a work permit is granted. Refer to Permit to Work.

Beginning and ending of all activities shall be reported to the Area Manager.

5.6.3 Production and Maintenance

- All activities on a H2S location shall be performed by two persons at the minimum, including normal routine work.
- Persons who perform activities on the location shall be in a position to make verbal contact with another person either directly or by means of radio system (Ex proof type).
- Tracing of H2S
  The tracing of (possible) H2S leakages, and determining the concentration of H2S in the air, shall be done by at least two persons wearing compressed air breathing apparatus. Each of these persons shall carry a properly working personal H2S detection apparatus. One of the persons observes the other(s) from outside the dangerous area. When entering the dangerous area the use of compressed air breathing apparatus is required. The person outside the dangerous area shall have a compressed air breathing apparatus ready for use stand by. This procedure is also applicable during opening of H2S containing installation parts (e.g. changing glycol filters, gaskets and/or valves, working on pig trap).
- Working in concentration above 10 PPM
  If the concentration exceeds 10 PPM or if there is no certainty about the concentration, activities shall be stopped. Only in case of emergency, blow out, manual shut down of the unit, working with the use of compressed air apparatus is authorized.
  The maximum continued use of compressed air breathing apparatus shall not exceed 30 minutes with self contained breathing apparatus (this may be shorter, depending on the condition of the person). This time will allow for replacement of personnel and compressed air.
5.7 Commissioning operations

The company’s policy for treating H2S situation during both construction and commissioning period is as follows:
- Under normal conditions – i.e. stable situation – all personnel should be aware about H2S and its effects and risk, all personnel should be aware about the evacuation points, rescue team should be under continuous training course and subcontractor should have training class for all of their personnel.
- In the case of H2S exposure the trained rescue team should act as quickly as possible and clinical health care services should be provided for exposure personnel
- The H2S leakage and exposure area shall be barricaded and sterilely monitoring should be carrying out for prevention of exposure for other personnel until normal situation.

5.8 Treatment of H2S Poisoning

5.8.1 Introduction

Treatment of life threatening H2S poisoning, characterized by loss of consciousness and associated respiratory failure, is aimed at:

- Maintaining respiration by First Aid measures. **Oxygen resuscitator must be used as soon as possible.**
- Treatments of local irritant effects of H2S gas on the eyes and mucous membranes of respiratory tract by supportive measures and medical treatment, by medic.
- Enhancing detoxification by administration of antidotes, by medic.

5.8.2 Maintaining respiration

Immediately remove victim from the hazardous area to fresh air while wearing SCBA* and using the buddy system (i.e. 2 people, 1 rescuing, 1 in stand by in safe area).
Immediately call site clinic medic, advanced first aiders.

Note (*): The **Escape Mask** is not considered as protective equipment for rescue/intervention. Self Contained Breathing Apparatus (SCBA) **must be worn to remove the victim from contaminated area.**

Check mouth of victim (false teeth, chewing gum, etc …) and clear if needed. If he is breathing, maintain at rest and administer O2 if available.

If breathing has ceased or is laboured, start artificial respiration to clear lungs of contaminated air. Prior to applying mouth to mouth respiration, try to expel gas from victim’s lungs by pressing down the chest, to prevent rescuer himself from being gassed by breathed H2S. Apply O2 resuscitator as soon as available on site to support respiration, once the victim resumes breathing spontaneously.
If it is impossible to move victim to fresh air, apply resuscitator immediately after checking victim’s mouth as above. The role of oxygen in the treatment of H₂S poisoning is essential: this is the **fastest method** for counteracting the effects of H₂S inhalation. Keep then victim at rest and prevent the victim from becoming cold. Evacuate then the victim if necessary as per relevant Medevac procedure.

5.8.3 **Treatment of Local Irritant Effect**

If eye contamination has occurred, flush with clear water for up to 10 minutes. If pulmonary edema has developed or is expected to develop, the inhalation of adrenocortical steroids aerosols with oxygen is advised.

5.8.4 **Enhancing Detoxification**

Treatment to enhance detoxification exists but requires extreme care and high medical knowledge. They will therefore only be carried out by a qualified medical practitioner.

5.8.5 **First Aid and Medical Equipment**

- Oxygen resuscitator
- O₂ inhalator
- First aid kit containing:
  - Call medical assistance.
  - Bring the injured away from the exposure area.
  - Keep the calm warm and in fresh air.
  - Unconsciousness and breathing loosen tight clothing and put in recovery position.
  - Adrenocorticoid for injection
  - Eye wash solution: Eye contact with liquid or high vapor concentrations of gas the eyes should be rinsed out with large volumes of water for at least 15 minutes.
  - Usual first aid equipment

Medical kit containing:

- Adrenocorticoid for injection
- Eye wash solution
6. Training

H₂S training and personal certification is required to anybody prior to working in a sour gas area.

The HSE supervisor will permanently attend on board to familiarize all personnel with the safety and monitoring equipment and to deliver certificate upon satisfactory completion of the training.

Training will take place at new comer arrival and will include the following:
- Induction and briefing of all new arrivals on the dangers of H₂S and the correct procedures to follow.
- The use of breathing apparatus, airlines, and escape sets.
- The use and calibration of all gas monitoring equipment and detectors.
- Recognition of alarms and action to be taken.
- Evacuation drills.
- Musters at Safe Briefing Areas.
- Rescue operations from ‘difficult’ access areas of the installation.
- Working while wearing respiratory protection.
- First aid for H₂S victims, including resuscitation techniques.
- Explanation of the contingency plan.

Information relating to safety measures in the event of H₂S will be predominantly posted around the installation.

Training and certification will also be organized in work place before gas in under the responsibility of the Site Manager.

7. DEFINITIONS

N/A

8. REFERENCES

NIOSH manual of analytical methods(nmam) 5th edition

9. APPENDIXES

APPENDIX 1- H₂S alert in different concentration
## APPENDIX 1 - H₂S alert in different concentration

<table>
<thead>
<tr>
<th>H₂S levels in air</th>
<th>1-10 ppm</th>
<th>10-25 ppm</th>
<th>25-50 ppm</th>
<th>&gt;50 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All personnel in test area, downwind and drill floor mask up Follow periods may continue Testing personnel working in pairs (buddy system) Hazardous area to be chained off with signs, and check in—check out by personnel coordinator. Announce safe briefing area</td>
<td>Ensure H₂S detection of accommodation inlet ventilation is working properly. Non-essential personnel to accommodation safe briefing area including those from external cabins All personnel outside accommodation mask up Personnel working in pairs Close unit, then master valve Investigate source of leak and if isolation not possible terminate test Follow periods only in daily light Only authorized person (+1 assistant) wear BA, mask up and using suitable hand portable equipment investigate source of H₂S Radio operator: notify standby vessel of situation and instruct him to go upwind. Inform helicopter to stay clear. Members, subcontractor and leader Rep: standing by, to make announcement as required. Alert other personnel and worker and operator</td>
<td>Ensure H₂S detection of accommodation inlet ventilation is working properly. Non-essential personnel to accommodation safe briefing area including those from external cabins. All personnel outside accommodation mask up Personnel working in pairs Close unit, then master valve Investigate source of leak and if isolation not possible terminate test No helicopter permitted Follow periods only in daily light Only authorized person (+1 assistant) wear BA, mask up and using suitable hand portable equipment investigate source of H₂S Radio operator: notify standby vessel of situation and instruct him to go upwind. Inform helicopter to stay clear. Members, subcontractor and leader Rep: standing by, to make announcement as required. Alert other personnel and worker and operator</td>
<td>Terminate testing &amp; inform onshore duty offices.</td>
</tr>
</tbody>
</table>
SUGGESTIONS FOR THE POGC
H2S SAFETY PROCEDURE

MANAGER, HSE Department
Pars Oil & Gas Company
Tehran I.R. Iran

Please consider the following suggestion(s) relative to the POGC H2S safety procedure:

_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_____________________________________________________________________________________________
_________________________________________________________________________________________

(Signature)

(Date)

(Address)

Contact Telephone Number

Contact FAX Number