SECTION 3 CHAPTER 7
HYDROGEN SULFIDE

Purpose

The Hydrogen Sulfide Program is designed to inform and protect employees at sites where hydrogen sulfide gas is present.

Scope

These regulations apply to all locations where the potential concentration of hydrogen sulfide (H_2S) in the ambient air is 10 PPM (parts per million) or greater. This includes, but is not limited to, sites where the following operations take place:

- drilling
- tank gauging
- field maintenance of wells
- water, steam, or fire flood operations
- work-over operations
- stripping of H_2S and carbon dioxide from crude oil
- sulfur recovery during desulfurization of sour crude and from contaminated molten sulfur
- injection of sour gas back into formation to stimulate oil production
- acid cleaning of wells and process units

These regulations also apply to:

- confined spaces
- areas near leaks in pumps or lines
- injection well houses

In this chapter

Purpose

This document outlines the basic information required to identify H_2S, including:

- common names
- sources
- properties

Identifying H_2S

Common names for hydrogen sulfide include:

- H_2S
- stink damp
- sulfurated hydrogen
- sour crude
- rotten-egg gas
- hydrosulfuric acid
- sulfur hydride
- sour gas
- silent killer

Sources

H_2S is produced during:

- industrial operations
- bacterial action
- decomposition of organic matter containing sulfur

When H_2S occurs in natural gas and oil reservoirs, it is usually mixed with other hydrocarbons. H_2S escapes from other hydrocarbons as it reaches the surface. Heat accelerates this process.

Physical properties

Characteristic	Comments
Toxic	No one can develop immunity to H_2S. • Low levels can damage the respiratory system. • High levels will kill within minutes.
Colorless	H_2S cannot be seen.
Offensive Odor ⚠	In low concentrations, H_2S has an offensive odor, which resembles rotten eggs. **Because H_2S deadens the sense of smell, odor is not a good indicator of its presence or concentration.**

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Physical properties
continued

Characteristic	Comments
Soluble	H_2S is soluble in water and hydrocarbons and will absorb into most liquids at elevated pressures, but emerges as a gas in ambient conditions. H_2S dissolves in water to produce a very weak hydro sulfuric acid.
Corrosive	H_2S is corrosive to • most metals, especially in the presence of water • plastics • tissues and nerves H_2S can cause extreme damage to valves and piping, including hydrogen embrittlement and sulfide stress cracking.
Heavier than air	H_2S is heavier than air, but can be dispersed over great distances with only a slight breeze. Because of its weight, it will collect in poorly ventilated and low-lying areas, including pits, ditches, and cellars.
Flammable	H_2S is flammable when mixed with air and burns with a blue flame. It can be ignited by: • 500ºF heat • burning cigarettes • hot engine manifolds • electrical arcs • welding rods H_2S's explosive range varies from 4.3-46% by volume.
Toxic by-products	When ignited, H_2S produces sulfur dioxide (SO_2), which can cause pneumonia and respiratory damage if inhaled. Avoid flare stacks and burning pits when H_2S is flared or ignited.
Reactive	H_2S reacts with soluble metal salts to produce insoluble sulfide precipitates. For example, H_2S reacts with lead acetate to produce dark brown lead sulfide.

Chemical properties

Property	Value
Molecular weight	34.08
Specific Volume	11.2 ft. ^{3}/lb. @ 68º & 14.7 psia.
Specific Heat	0.243 BTU/lb. - ºF
Boiling Point	-75ºF, -60.4º C (760 mm Hg)
Critical temperature	212º
Critical pressure	1306 PSI
Gas constant ®	45.2 (ft-lb.-ºF)
CP/CV	K=1.30
Ignition Temperature	500º F (260º C) (Methane - 1000º F)
Vapor pressure	17.7 ATM @ 68ºF (20º C), 19.6 ATM @ 25º C
Density of liquid	0.790 @ 60º F 14.696 psia
Density of gas	1.539 g/1 A 0º C
API gravity of liquid	47.6 @ 60º & 14.696 psia
Ft ^{3}/gal of liquid	73.28 @ 60º F 14.696 psia
Lbs./MCF	89.79 @ 60º F 14.696 psia
BTU/ft ^{3}	680 @ 60º F 14.696 psia
pH	3 in saturated water

Understanding the Effects of Hydrogen Sulfide

Purpose

This document summarizes:

- exposure methods
- symptoms of H_2S poisoning
- factors that increase the effect of H_2S
- exposure levels

Exposure methods

Exposure to H_2S is one of the leading causes of sudden death in the workplace. H_2S enters the bloodstream through:

- inhalation
- ingestion
- injection
- skin absorption

Since injection of H_2S rarely occurs in the workplace, this document deals with the effects of H_2S when it:

- is inhaled
- by touch (absorption)
- comes into contact with the eyes

Symptoms can take hours to develop or may run their course in seconds, depending on the concentration of H_2S.

IF you notice any of the following symptoms in yourself or in others, **THEN** exercise the Emergency Response Plan for H_2S and seek medical help immediately.

Symptoms of H_2S poisoning by inhalation

When H_2S is inhaled, it passes directly through the lungs into the bloodstream. The body can break down or oxidize extremely low concentrations of the H_2S into a harmless compound, but H_2S will build up in the bloodstream and paralyze the nerve centers in the brain that regulate breathing. At this point, the lungs stop working and the victim suffocates.

Symptoms of H_2S exposure include:

- dryness in nose and throat and/or coughing
- headache
- loss of appetite and/or nausea
- fatigue, dizziness, and/or loss of consciousness
- irrational behavior
- difficulty breathing
- death

Symptoms of H_2S poisoning by touch

Symptoms of H_2S poisoning through contact with the skin include skin irritation and/or skin discoloration.

Symptoms of H_2S poisoning through eye contact

Symptoms of H_2S poisoning through contact with eyes include:

- eye irritation
- pain or burning sensation in eyes
- blurred vision
- painful secretion of tears

After-effects of H_2S exposure

Since H_2S is oxidized rapidly within the body, permanent after effects are rare unless the victim is deprived of oxygen for a significant period of time.

Pulmonary edema may develop in extreme cases. Reports indicate that some symptoms may last for three or more days after exposure, including:

- nervousness
- dry non-productive cough
- painful breathing and/or pain in the nose and throat
- nausea
- headache
- insomnia
- eye irritation, inflammation, and/or pain
- excessive tearing and/or sensitivity to light

Although repeated exposures may increase sensitivity, they do not appear to result in accumulative poisoning.

Factors that increase the effects of H_2S

The effects of H_2S depend on the victim's sensitivity and the:

- duration of the exposure
- frequency of exposure
- intensity of exposure (concentration of H_2S)

Several health conditions can increase the effect of H_2S, including:

- punctured ear drum
- emphysema or asthma
- diabetes
- epilepsy
- eye infections
- anemia
- alcoholism or consumption of alcohol within the past 24 hours

Individuals with these conditions must minimize or avoid exposure to H_2S.

Exposure levels

The 8 hour threshold limit value (time-weighted averaged concentration of H_2S) must not exceed 10 PPM. The following table outlines the permissible exposure limits (PELs).

Time period	OSHA PELs
Time weighted average over any 8-hour shift in a 40 hour work week (TWA) may **not** exceed …	10 PPM
Short term exposure limits (STEL): TWA over 15 minutes in any given shift may **not** exceed …	15 PPM

Exposure hazards

The following chart outlines the hazards of various exposure levels. Symptoms listed in one stage continue or worsen through the rest.

Note: Medical conditions or other non-obvious factors may impact an individual's tolerance for H_2S. **Never** assume that you can withstand large concentrations of the gas.

Concentration	Symptoms
.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.

Note: PPM is the concentration of H_2S in the atmosphere, expressed as the number of H_2S parts present in a million parts of air. This concentration is based on the amount of H_2S in the gas stream before it passes through any surface equipment.

One part per million (PPM) of H_2S is roughly proportional to:

- one inch per 15.5 miles
- one second per 11.5 days

A 1% concentration of H_2S is equal to 10,000 PPM. Only 300 PPM is required to cause death in 0-2 minutes.

Developing an H_2S Contingency Plan

Purpose

Each rig unit, truck, yard which is working in an H_2S environment should submit an H_2S Contingency Plan to the line of Business Vice President and Director of Safety for approval before conducting any operations. This document outlines the requirements for developing that plan, including provisions for:

- safety regulations
- responding to H_2S releases
- handling evacuation
- monitoring operations

Distributing the plan

A copy of the approved plan should be kept in the field. All operators will follow the plan at all times.

Criteria for safety regulations

All H_2S Contingency plans must address:

- safety procedures and rules concerning equipment, drills, and smoking
- training provided by the company for all employees, contractors, and visitors
- a plan for providing respiratory protection equipment to all personnel, including contractors and visitors
- a description of personnel protection measures or evacuation procedures you will initiate when the H_2S concentration reaches 10 PPM
- engineering controls to protect personnel from H_2S

Criteria for H_2S response plans

All H_2S Contingency plans must include descriptions of the procedures to be taken in response to an H_2S release. These plans must include:

- actions taken when the concentration of H_2S reaches 10 PPM
- personnel responsible for those actions
- description of the audible and visual alarms to be activated
- a list of at least two briefing areas, where personnel will assemble during H_2S alerts (Note: at least one of these areas must be upwind of the H_2S source at any given time)
- a list of the agencies and facilities to notify if H_2S is released as well as how they will be reached and contact information
- a list of medical personnel and facilities, including phone numbers and addresses

Criteria for handling evacuations

All H_2S Contingency plans must also include evacuation procedures, including:

- criteria for deciding when to evacuate
- procedures for evacuation

Monitoring operations

H_2S Contingency plans should include information regarding the location/equipment procedures for monitoring operations, including:

- location of H_2S detectors
- any special equipment, procedures, or precautions used to conduct a combination of drilling, well completion, well workovers, and production operations simultaneously

Working in an Environment that Contains H_2S

Purpose

This section outlines:

- the safety precautions for H_2S environments
- the responsibilities of:
  - supervisors
  - employees
  - operators
  - customers
- the procedure for working in hydrogen-sulfide rich environments

Safety precautions

Never enter marked areas without proper training, equipment, or authorization. Employees working in H_2S areas must be clean-shaven to ensure a proper respirator mask-to-face seal.

When working around H_2S:

- conduct a JSA to assess possible hazards
- in high gas areas a portable gas monitor shall be worn
- always work in pairs when possible, to avoid being trapped in H_2S environments
- maintain adequate ventilation in all areas
- avoid low-lying areas where H_2S may collect

When working in areas suspected of having a concentration of H_2S greater than 10 PPM, personnel must:

- conduct a JSA to assess possible hazards
- wear the proper PPE, wear a portable gas monitor and respiratory protection
- maintain and monitor devices indicating the wind direction including wind socks and streamers
- maintain reliable communications within the area

Yard Manager/ Supervisor responsibilities

Yard Manager/Supervisors or designated persons are responsible for:

- obtaining the safety procedures of customers
- training all personnel who work in or around areas where hazardous levels of H_2S are suspected on:
  - the characteristics of H_2S
  - its dangers
  - safety procedures to be used when it is encountered, including:
    - use and location of personal protection equipment
    - CPR
    - rescue and first aid procedures
    - emergency numbers
    - escape routes and evacuation plans
- ensuring that all employees who may be required to use respirators or self-contained breathing apparatus (SCBA):
  - are trained on the use of that equipment
  - have annual medical evaluation approved by a LHCP
  - are properly fit-tested as required by the Company Respiratory Protection Program *(*See *Respiratory Protection* in this manual.)
- posting the following in visible and readily accessible locations:
  - warning signs for visitors and others unfamiliar with the area
  - phone number of supervisors and emergency personnel (ambulance, police, fire department, doctors, hospital)

Employee responsibilities

Employees are responsible for:

- ensuring they have and use all required personal protective equipment
- using required H_2S monitoring equipment
- complying with all company and customer safety rules required at the site
- vacating to the muster area when concentrations of H_2S reach 10 PPM

Customer responsibilities

Before the company will enter on to a location that has a H_2S concentration of 10 PPM or greater in the ambient air, Federal statutes require the customer to provide the Company with:

- a current copy of its:
  - H_2S plan
  - safety rules and policies
  - current gas analysis showing detailed content of the gas, including the concentration of H_2S in the gas stream
- an on-site briefing to company personnel on emergency procedures and operation of all equipment

Procedure/Rigs

When rig work is required on any location where the concentration of H_2S is 10 PPM or greater in the ambient air, the supervisor will assure that a minimum of at least two employee's per rig are trained in:

- CPR

All employees on location that will be responsible for using respiratory protection will be trained in:

- H2S safety
- the company's H_2S safety program and equipment
- the customer's H_2S plans

Required Training

Purpose

This document outlines the training requirements and course content for employees

Course content

Required training sessions must cover:

- hazards of H_2S
- provisions for personal safety in the H_2S Contingency Plan
- proper use of safety equipment
- how to test and bump test the assigned H_2S equipment
- how to calibrate the assigned H_2S equipment
- location of:
  - protective breathing equipment (SCBA)
  - H_2S monitors and alarms
  - ventilation equipment
  - briefing areas
  - warning systems
  - evacuation routes
  - direction of prevailing winds
- procedures to follow in the event of a hazardous gas release
- restrictions and corrective measures for facial hair, glasses, and contacts
- CPR/first-aid training and the location of:
  - first aid kits
- maintenance procedures to follow to keep assigned H_2S equipment fully functional

Training employees

All employees with the potential to be exposed to H_2S above the occupational exposure limit (OEL) or permissible exposure limit (PEL) must:

- receive training before beginning work (in a H_2S environment)
- receive an instructor led 3–4-hour minimum training provided during the new hire safety orientation
- complete refresher training annually within one year of completing the previous class

Trained employees transferred from another yard must attend a supplemental briefing on H_2S equipment and procedures before beginning duty at the yard.

Stocking Safety Equipment

Purpose

All yards must make the following equipment available to affected personnel when working in H_2S environments:

- respiratory equipment
- monitoring equipment
- first aid and rescue equipment
- communications equipment

This document outlines the requirements for this safety equipment.

Respiratory equipment

Using respirators

- Design, select, use, and maintain respirators to conform to ANSI Z88.2 American National Standard for Respiratory Protection (see *Respiratory Protection* in this manual).
- Store protective-breathing equipment in a location that is quickly and easily accessible to all personnel.
- Label all breathing-air bottles as containing breathing quality air for human use.

The following table outlines the requirements for respiratory equipment.

Required equipment	Quantity
self-contained pressure-demand respirators with hoseline capability and breathing time of at least 15 minutes	enough to provide all personnel, contractors, and visitors with immediate access
spectacle kits	as needed
system of breathing-air manifolds, hoses, and masks at the facility and briefing areas	determined by yard operations
cascade air-bottle breathing apparatus bottles	determined by yard operations
Optional: high-pressure compressor suitable for providing breathing-quality air located in an uncontaminated atmosphere	if desired to recharge the cascade air-bottle system

Detection equipment

All rigs/units must have portable/fixed H_2S monitors capable of detecting 10 PPM concentrations available for use by all personnel. **If monitors detect concentrations of H_2S and the alarm sounds, all employees in the affected area must vacate to muster area.** See "Detecting H_2S" on p. 18 for more information.

First aid and rescue equipment

This table summarizes the first aid equipment required for operations in H_2S areas. Additional information can be found in *Guidelines for First Aid and Medical Assistance* in this manual.

Required equipment	Quantity
first-aid kit	size and content determined by the number of personnel
SCBA (30 minute) Escape pack (5 minute)	Two(2) Per Rig One(1) if required by customer
Derrick Rescue Kit	As required by Corporate

Using Warning Signals

Purpose

This document outlines the requirements for:

- posting required safety signs
- installing wind direction equipment
- using alarms

Posting required safety signs

H_2S warning signs must be displayed at all times on locations/rigs

- with wells capable of producing H_2S
- that process gas containing H_2S in concentrations of 10 PPM or more

Installing wind direction indicators

Install wind direction equipment in a location that is visible at all times to individuals on or in the immediate vicinity of the facility when there are concentration of 10 PPM or more.

Alarms

When atmospheric concentrations of H_2S reach 10 PPM:

- automatic alarms will sound with flashing red lights

Detecting H_2S

Purpose

This document provides an overview of the equipment and methods used to detect H_2S in the workplace.

Detection

Do not rely on your sense of smell to detect H_2S. Although you can smell extremely low concentrations of H_2S, lethal concentrations of H_2S greater than 100 PPM kill the sense of smell almost instantly.

Use detection equipment when working in an area where there is a possibility of H_2S gas. The following detection units are available for use in the field:

- hand-operated tube detectors
- personal detectors
- fixed detectors

Detecting H2S by smell

H_2S can paralyze the sense of smell. Do **not** rely on smell to detect H_2S.

The following table outlines the subjective odor responses to various levels of H_2S.

Concentration	Effect
0.02 PPM	No odor.
0.13 PPM	Minimal perceptible odor.
0.77 PPM	Faint but readily perceptible odor.
4.60 PPM	Easily detectable, moderate odor.
27.0 PPM	Strong, unpleasant odor, but not intolerable.
30.0 PPM	Odor does not appear stronger as concentration increases.

Using hand-operated tube detectors

Physical description
The hand-operated tube detector incorporates a hand pump or a syringe, and a glass detector tube.

Continued on next page

Using hand-operated tube detectors

Operating instructions

Reading these types of detectors is like reading a thermometer.

Step	Action
1	Choose a tube designed to measure H_2S, and check the range of H_2S concentrations that the tube can measure.
2	Verify that the tube you have selected is appropriate for the job and familiarize yourself with the operating instructions for the selected model.
3	Check the expiration date on the tube. **IF** the tube is out-of-date, **THEN** replace it as soon as possible.
4	Calibrate the tube according to the manufacturer's instructions.
5	Once in the work area, use the hand pump or syringe to draw an air sample into the tube.
6	Watch as a reaction between the air and a chemical agent in the tube causes a discoloration to seep down the tube.
7	Note the point on the scale where the discoloration ends. This is concentration of H_2S in PPM in the ambient air.
8	Repeat steps 5-7 periodically while in the suspect area.
9	Once work is completed, follow the manufacturer's recommendations to store the tube.

Advantages

Tube detectors can accurately measure up to 1,000 PPM of H_2S.

Disadvantages

Personnel must be exposed to the atmosphere before detection is possible.

Using personal monitors

Description

This light-weight, portable detector is battery-operated and features:

- an electronic sensor
- an audio alarm
- a vibration feature
- a flashing light
- a digital display
- or combination of all the above

These units are designed to be worn in close proximity to the employee’s breathing area.

Continued on next page

Using personal monitors

Operating Instructions

Step	Action
1	Follow the manufacturer's instructions to test the alarm before each use.
2	Turn on the monitor.
3	When the sensor detects H_2S, it signals the controlling mechanism, which then displays the H_2S concentration in PPM. **IF** the alarm sounds before work is complete, **THEN** leave the area and take appropriate precautions. (**DO NOT THINK THE ALARM IS MALFUCTIONING).**

Advantage

The advantages of personal detectors include:

- quick reaction time
- built-in alarm system

Disadvantage

Workers have to be exposed to the atmosphere before detection is possible.

Using fixed monitors

Description

Fixed detectors consist of sensor heads placed in suspect areas and attached to a controller unit housed in a hard plastic or metal case. When the sensors detect H_2S, they signal the controller unit. The controller unit analyzes the data and provides an exact reading of the H_2S concentration (in PPM) on a digital or needle type indicator. When a predetermined level of H_2S has been detected, relay devices activate warning alarms and/or lights in the work area.

These detectors can also be used to detect other combustible gases, including:

- carbon dioxide (CO_2)
- carbon monoxide (CO)
- methane (CH_4)

Various fixed detection systems are available to meet different installation requirements.

Continued on next page

Using fixed monitors

Operating Instructions

Step	Action
1	Mount sensor heads in suspect areas (e.g., well heads, pumps, compressors, etc.) as low to the suspect gas as possible **REMEMBER H_2S GAS IS HEAVIER THAN AIR**.
2	Connect the sensor heads to the controller
3	Before entering the suspect area: • calibrate the unit • check the level of H_2S in the area • take all necessary precautions based on the concentration of H_2S in the work area
4	Before entering the work area, set the alarm to sound once a specific concentration of H_2S is detected 10 PPM.
5	**IF** an unsafe level of H_2S is detected and warning alarms and/or lights in the work area go off, **THEN** leave the area and take necessary precautions before continuing work. (**DO NOT THINK THE ALARM IS MALFUCTIONING).**

Advantage
Fixed detectors offer a number of advantages over tube and personal detectors, including:

- 24-hour protection
- quick response time
- ability to monitor up to 12 different sensors in the work site (depending on the brand and model)
- ability to monitor hazardous areas without exposing personnel to the atmosphere

Disadvantage
Fixed detectors are relatively expensive.

Detecting H_2S during Drilling and Well Operations

Purpose

This document outlines the requirements for:

- placing sensors
- monitoring H_2S levels

Placing sensors

During drilling, well-completion, and well-workover operations, you must place H_2S sensors:

- by the well head as close to the ground as possible, down wind
- or at the rig floor

Monitoring H_2S

You must continuously monitor H_2S levels while:

- pulling wet string of drill pipe or workover string
- circulating bottoms-up after a drilling break
- cementing
- logging
- circulating to condition mud or other well-control fluid
- anytime you are rigged up on a suspected H_2S location

Testing H_2S Monitors

Purpose

Testing both fixed and personal monitors regularly is important to the H_2S program. This document outlines the requirements for testing H_2S monitors.

Required training

Personnel must be trained to test, bump test, and calibrate the particular H_2S detector equipment being used.

Testing requirements

The following table outlines the requirements for testing detectors.

IF…	THEN…
performing • drill stem testing • well-completion **OR** • well-workover operations,	test all detectors at least once every 24 hours.(preferably every morning at rig start up)
drilling,	test all detectors: • at least once every 24 hours • before the bit is 1,500 feet above the potential H_2S zone
using fixed or portable electronic sensing devices to monitor H_2S levels,	calibrate the detectors every month
the equipment requires calibration as a result of two consecutive functional tests,	the Supervisor may require that H_2S detection and monitoring equipment be tested and calibrated more frequently

Calibrating monitors

Follow the manufacturer's recommendations and specifications for calibrating monitors. Calibrate monitors by exposing them to a known concentration of H_2S between 10-30 PPM. **IF** the results of any functional test are not within 2 PPM or 10 percent, whichever is greater, of the applied concentration, **THEN** recalibrate the instrument. Gas monitors should be bump tested daily before beginning job task.

Record-keeping

Keep records of testing and calibrations at the yard to show the present status and history of each device. Records must include dates and details concerning:

- installation
- removal
- inspections
- repairs
- adjustments
- reinstallation

Records must be available for inspection by the Safety Department.

Performing an Emergency Rescue Operation

Purpose

This section outlines the procedure for running an emergency rescue operation.

Procedure

Depending on the H_2S concentration, minutes could mean the difference between life and death. However, rushing into the hazardous area without proper protection will result in two victims instead of one, and is the main reason why rescue efforts fail.

Never attempt a rescue without proper respiratory protection in the form of a SCBA or an approved hose unit.

Use the following procedure to rescue someone overcome by H_2S.

Step	Action
1	Activate the ERP for your rig/location.
2	Put on a respirator.(make sure someone has another respirator on to cover you)
3	Move quickly but carefully to the victim.
4	Move the victim to a safe area upwind or crosswind of the hazardous area.
5	Begin CPR/first aid, if applicable, as described in the next section.
6	Contact the proper medical authorities.

Giving First Aid

Purpose

This document outlines the principles of administering first aid to H_2S victims, including the procedures for determining the type of exposure and providing the appropriate first aid treatment.

Determining exposure type

Before administering first aid, determine whether the exposure has occurred through:

- inhalation
- skin contact
- eye contact

The procedures for treating each type of contact follow.

Treating a victim exposed to H_2S through inhalation

H_2S in the blood is detoxified rapidly and symptoms of poisoning may disappear when inhalation of the gas ceases. Use the following procedure to treat a victim who has inhaled the gas.

Step	Action
1	Move the victim to a fresh air environment upwind or crosswind of the hazardous area.
2	Briefly apply the chest pressure-arm lift method of artificial respiration to clear the victim's lungs. Do **not** inhale any toxic gas directly from the victim's lungs.
3	<table><tr><th>IF…</th><th>THEN…</th></tr><tr><td>the victim is **not** breathing,</td><td>remove your respirator and begin mouth-to-mouth artificial respiration. Continue until the victim is breathing on his/her own or is pronounced dead.</td></tr><tr><td>the victim's breathing is slow, impaired, or labored,</td><td>use a resuscitator to administer oxygen. (if available)</td></tr></table>
4	Once the victims is breathing on his/her own or with a resuscitator, remove all contaminated clothing from the victim and keep him/her warm and quiet.
5	Transport the victim to a doctor or medical facility as soon as possible.

Treating a victim exposed to H_2S through eye contact

Contact with liquids or gases containing H_2S can cause painful eye irritation. Use the following procedure to treat this irritation.

Step	Action
1	Flush the eyes with fresh water or eye wash solution for at least 15 minutes.
2	Apply cool compresses to the eyes.
3	Transport the victim to a doctor, preferably an eye specialist, as soon as possible.

Treating a victim exposed to H_2S through skin contact

When combined with perspiration, H_2S produces a mild solution of sulfuric acid that irritates the skin and may cause skin discoloration.

Treat this condition by washing the affected area with fresh water for at least 15 minutes. **IF** the victim experiences discomfort or if the irritation is extreme, **THEN** transport the victim to a doctor as soon as possible.