

# **TAYLOR ENERGY COMPANY**

## **SAFE DRILLING AND WORKOVER PRACTICES MANUAL**

*Prepared by*

**Paragon Engineering Services, Inc.**

13939 Northwest Freeway, Suite 121

Houston, TX 77042-5196

phone: (713) 462-8828

fax: (713) 462-6524

Paragon Job No. 94540

## TABLE OF CONTENTS

---

1. Introduction 1-1
  - 1.1 Corporate Health, Safety, and Environmental Policy 1-1
  - 1.2 Purpose, Intent and Applicability 1-3
  - 1.3 Taylor Safety Contacts 1-4
2. General Safety Rules 2-1
3. Safe Work Practices 3-1
  - 3.1 General 3-1
  - 3.2 Alcohol, Drugs, and Firearms 3-2
  - 3.3 Personal Protective Equipment and Clothing 3-3
  - 3.4 Environmental Protection 3-5
  - 3.5 Fire Prevention 3-6
  - 3.6 Lockout Procedures 3-8
  - 3.7 Confined Space Entry 3-9
  - 3.8 Hot Work Operations 3-16
  - 3.9 Hydrogen Sulfide (H<sub>2</sub>S) 3-22
4. Training and Qualifications 4-1
  - 4.1 General 4-1
  - 4.2 Initial Training 4-2
  - 4.3 Periodic Training 4-3
  - 4.4 Communication of Change 4-5
  - 4.5 Qualification of Instructors and Certifying Agency 4-6
  - 4.6 H<sub>2</sub>S Certification 4-7
  - 4.7 Blowout Prevention Certification 4-9
  - 4.8 First Aid Certification 4-10
  - 4.9 Documentation 4-11

## TABLE OF CONTENTS (Continued)

---

5.	Operations Procedures	5-1
5.1	General	5-1
5.2	Mechanical Hazards	5-2
5.3	Electrical Hazards	5-4
5.4	High-Pressure Systems	5-9
5.5	Tubulars Handling	5-10
5.6	Well Control	5-12
5.7	Drilling Mud/Chemical Hazards	5-13
5.8	Inclement Weather Operations	5-14
5.9	Offshore Operations	5-15
5.10	Workover Operations	5-17
5.11	Rigup/Rigdown	5-19
5.12	Vehicular Operations	5-21
6.	Emergency Drills	6-1
6.1	General	6-1
6.2	Fire/Explosion	6-2
6.3	Blowouts and Kicks	6-4
6.4	Toxic Gas Releases	6-5
6.5	Evacuation	6-6
6.6	First Aid/Medical Response	6-7
6.7	Oil Spills and Pollution	6-8
7.	First Aid - Reference Index	7-1
7.1	Basic First Aid Facts	7-2
7.2	First Aid Guidelines	7-5
8.	Industry Standards and References	8-1

## LIST OF FIGURES

---

Confined Space Entry Permit 3-15

Hot Work Permit 3-21

## **1. INTRODUCTION**

# **1. SAFETY PROGRAM**

## **1.1 CORPORATE HEALTH, SAFETY AND ENVIRONMENTAL POLICY**

Consistent with Taylor Energy Company's goals and values, which include concern for our employees, persons doing business with us, and the citizens of the communities where we have an impact, we wish to confirm our position regarding health, safety and the environment. It is our policy to conduct our operations and handle and dispose of all materials in connection with our exploration and production operations safely and without creating unacceptable risks to human health, safety or the environment. We will do the following:

- Establish and maintain programs to educate our employees to assure that laws and regulations applicable to our operations are understood and obeyed;
- Anticipate health, safety and environmental issues and adopt our own standards where laws or regulations may not be adequately protective;
- Survey our operations periodically to determine that we are fully in compliance with this policy and all applicable laws and regulations;  
and
- Stop any operation if the health, safety or environmental risks become unacceptable.

To implement this policy, we will do the following:

- Assign responsible, qualified personnel to the management and control of health, safety and environmental matters;
- Identify and control health, safety and environmental hazards stemming from our operations;
- Conduct accident prevention, occupational safety and health, and pollution prevention and control programs to safeguard our employees and all persons from injuries or health hazards and to protect the quality of the environment;

- Work constructively with trade associations, government agencies and others to develop equitable and reasonable fact-based laws, regulations and standards and challenge inappropriate laws, regulations and standards when data are available to support our positions;
- Require all parties with whom we have a contract for services to conduct themselves in accordance with our policy when performing work for us; and
- Make the necessary expenditures to implement this policy and to fulfill our role as a responsible corporate citizen.

Supervisors have a special obligation to keep informed about health, safety and environmental risks and standards in their areas of operation and to advise their managers promptly of any potential problem or adverse situation which comes to their attention. Everyone on the Taylor team is expected to understand, promote and assist in the implementation of this policy.

## 1.2 PURPOSE, INTENT, AND APPLICABILITY

This manual has been written and is provided as a safety guide for Taylor employees who supervise contractors and sub-contractors employed by or for Taylor Energy Company in its drilling operations. It is understood that each contractor will have its own company safety program in place and in use prior to beginning work on any Taylor drilling project. The primary purpose of this manual is to supplement the contractor's existing safety program by establishing minimum safety standards as required by Taylor and to provide guidance to the Taylor Rig Site Supervisor in his capacity as auditor of the contractor or sub-contractor's safety program to assure compliance with Taylor's minimum standards. It is expected by Taylor that its contractors' safety programs complement Taylor's own programs and aid in establishing a sound and responsible safety system.

Taylor Energy Company is highly committed to implementing an active safety program throughout its operations. It is expected that any company or person working for Taylor will share that same commitment. It is necessary for each person and every company involved in drilling operations, from starting a location to producing wells, to do his or her part in promoting and participating in the Safe Drilling and Workover Practices Program.

Taylor will make every possible effort to keep this manual current and up-to-date. It should be noted that all applicable governmental rules, regulations, and restrictions currently in effect, as well as those that may become effective in the future, shall take precedence over any relevant standards in this manual.

### 1.3 TAYLOR SAFETY CONTACTS

CONTACT	TELEPHONE
Operations Manager	(504) 581-5491
Safety Manager	(504) 593-8491
New Orleans Office	(504) 581-5491

## **2. GENERAL SAFETY RULES**

## 2. GENERAL SAFETY RULES

Taylor Energy Company is dedicated to providing safe and healthy working conditions for all employees, contract personnel, and visitors. Safety is our number one priority, followed by reliability and efficiency.

Although accidents may not be completely eliminated, injuries can be prevented. This premise is fundamental to a workable safety program. Taylor Energy Company's goal is to create a zero-injury environment. To assist in achieving this goal, this manual was developed to provide formal safety practices and guidelines. Nevertheless, this manual alone cannot prevent accidents or replace a common-sense approach to safety. Total commitment by management and a dedicated, involved work-force are indispensable ingredients in an effective safety program.

It is the responsibility of everyone involved to adhere to the practices outlined in this manual and to report all accidents, injuries, deficiencies and safety violations. Failure to obey these safety rules can result in serious injury and may lead to disciplinary action, including termination.

All personnel should be encouraged to make suggestions, to establish high personal goals for eliminating accidents and injuries, and to participate in informal meetings to discuss the safety aspects of each assignment. If the source of a hazard cannot be eliminated, certain measures can be taken to reduce the danger of the hazard. For instance, special procedures, safety devices or protective equipment and clothing may be used.

Taylor and its employees, contractors, and visitors have the responsibility to comply with all federal, state and local regulations related to safety and health programs. It is hoped that everyone will join in making Taylor Energy Company an industry leader in safety and loss prevention. Please read this manual carefully and ask questions if the material is unclear; a job is not well performed if it is not understood and performed safely!

1. **SAFETY AWARENESS.** Become familiar with the contents of this manual, paying particular attention to the sections that apply to your particular assignment.
  - a. Confirm that duties are understood and performed in a safe manner by following approved safety practices.

- b. Ensure that everyone involved maintains an active interest in the safety program, attends all safety meetings, and becomes familiar with new safety practices and procedures.
- c. Attend informal daily safety meetings lasting from five to ten minutes. These “tail-gate” meetings may be as simple as the actions of one employee running through a mental checklist of the safety aspects of his next work assignment. Periodic group meetings are also encouraged. At these meetings, supervisors and other trained employees or third-party specialists can provide in-depth details of new procedures or equipment. It is imperative that everyone give his or her undivided attention in meetings of this type. Taylor’s Safety Manager will provide assistance in this area.
- d. Observe workers’ and other people’s actions that could cause accidents. Do not let people be coerced into participating in unsafe work. Do not hesitate to inform any personnel of an unsafe situation.
- e. No one should enter an area if there is reasonable doubt about a potential hazard, and no one should perform work on or with equipment that is unsafe.
- f. It is up to you to inform the contractor of questions about safety practices or suspected safety or health hazards.

2. **EMERGENCY PROCEDURES.** All personnel must be briefed on emergency procedures and escape routes from work locations. The Taylor Rig Site Supervisor is responsible for ensuring that an Emergency Procedures Notice has been completed and is posted in the doghouse and the Tool Pusher’s house. Additionally, each individual is required to become familiar with the location of the following:

- a. Safety and life support equipment,
- b. First aid stations,
- c. Safety showers and eye washers,
- d. Fire-fighting equipment,
- e. Breathing apparatus and other protective equipment for hydrogen sulfide (H<sub>2</sub>S) if appropriate,

- f. Phones, radios, alarms and detection devices,
  - g. Emergency exit devices or means.
3. **BUDDY SYSTEM.** A supervisor should be notified if anyone will be working alone. No one shall be allowed to work alone in a hazardous area or under potentially unsafe conditions. The “buddy system” should be used in all cases in which the situation or working conditions are suspect or the safety rules prohibit working alone.
  4. **SAFETY CLOTHING AND EQUIPMENT.** All personnel should select and use the prescribed safety clothing and personal protective equipment for each particular job and should become familiar with the use of respirators if required.
  5. **LIFTING AND MOVING HEAVY OBJECTS.** Verify the use of proper lifting techniques when lifting or moving objects that are within an individual’s capability. No attempt should be made to lift or move a heavy object that may cause strained muscles or other bodily damage. Workers should ask for assistance from co-workers or obtain appropriate moving/lifting equipment.
  6. **HOUSEKEEPING.** The lack of good housekeeping can cause serious accidents and/or bodily injuries. It is the contractor’s responsibility to keep the work areas clean and to remove and clean tools, equipment and other materials at job completion.
    - a. Tools or materials should not be left in the derrick, on top of equipment, on scaffolds, on piping, on tanks or in any other places where they may become dislodged and fall.
    - b. All fuel, water, hydraulic, and air hoses, welding leads and electrical cables should be protected from crushing or cutting.
    - c. When work is performed in a confined space, all hoses, welding leads, electrical extension cords, etc., should be run through an appropriate opening other than the one used for entry (if possible).
    - d. Material or equipment must not be positioned in locations that will create stumbling hazards or will block exits, emergency equipment, controls, etc.
    - e. Spills of oil, mud, water, fuel, hydraulic fluid and chemicals constitute hazards and should be cleaned up immediately.

7. **SIGNS, TAGS AND BARRICADES.** The intent of all signs and tags is obedience. Barricades should not be crossed without proper authorization. A supervisor should be contacted if there are any questions regarding the installation or removal of these items.
8. **SAFETY SHUTDOWN CIRCUITS AND LOCKOUTS.** No one may disconnect, jumper or otherwise disable a safety device or circuit. Prior supervisor approval must be obtained when any device should be placed out of service for testing or maintenance.
  - a. All safety device malfunctions should be reported immediately, and the affected devices should be tagged. Replacements and other co-workers should be notified of the hazardous condition.
  - b. All disabled safety devices should be returned to their normal operating positions after testing, maintenance or replacement. Ensure that all associated instrumentation and other safety devices are functional and safe to operate.
  - c. Lockout devices should not be removed without proper authorization. Work on equipment that requires lockout devices shall not commence until the lockout procedure has been implemented.
9. **MAKESHIFTS AND TEMPORARY WORKING AIDS.** Any makeshifts that may compromise safety should not be used. In rare instances when a makeshift is necessary as a temporary measure, supervisory approval is required. Any makeshift shall be replaced or corrected with the appropriate equipment as soon as possible. As an extra precaution, replacements and other co-workers should be notified regarding the makeshift.
10. **OPENING A SYSTEM FROM WHICH PRESSURE HAS BEEN BLED OFF.** No one should ever assume that pressure has been completely bled off a closed pressure system. Even a pressure of only a few pounds per square inch can turn a plug, blind flange, valve part, etc., into a dangerous flying projectile. Gauge readings can be incorrect and vent valves can plug; therefore, it is essential that a system never be opened if the system's pressure has not been adequately bled off. Personnel should always stand aside when unscrewing a plug, gauge, or needle valve so that, if there is pressure on the system, the projectile will miss the face and body. Personnel should never remove the nuts from flange bolts until all the nuts are loosened and the pressure seal is broken and visually checked.

11. **TRIPS AND FALLS.** When moving about the work area, personnel should take care to avoid slipping, tripping, stumbling, or falling. Personnel should be especially careful when weather or other conditions may create or aggravate a hazardous situation.
12. **WORKING AT HIGH ELEVATIONS.** Personnel should exercise caution when climbing to or working at high elevations. Special precautions are necessary for work at locations without handrails (such as rooftops, tank tops, derricks, etc.). Safety belts must be worn and properly secured at elevations of more than 10 feet above the ground unless adequate protection against falling is provided. Personnel must use safety belts with all ladders that have safety climb mechanisms.
13. **RADIOACTIVE MATERIALS AND RADIOGRAPHIC EQUIPMENT.** In certain areas, usually in the form of scaled-in lines or vessels, naturally occurring radioactive material (NORM) may be present. The radioactivity of these scales is dangerous only if inhaled or ingested. All personnel should use caution when opening vessels or tubulars and should not inhale dust from scale materials present. Personnel should remain at a safe distance from radiographic equipment when such equipment is in operation.
14. **HYDROGEN SULFIDE (H<sub>2</sub>S).** Hydrogen sulfide is an extremely deadly gas. Every worker that can be exposed to H<sub>2</sub>S must have a knowledge of the gas, the way to recognize the presence of the gas, and the proper actions to take to avoid exposure. Extreme caution should be exercised when H<sub>2</sub>S is known or suspected to be present in a work area.
15. **WEATHER CONDITIONS.** Personnel should use appropriate protective clothing and safety equipment when working outdoors in inclement weather. Personnel should not work on the tops of tanks or structures during storms with high winds or lightning.
16. **HAZARDOUS WORKING CONDITIONS.** All personnel should continuously monitor the work site for hazardous conditions involving equipment, personnel or procedures. If possible, individuals should correct or eliminate any hazardous conditions. If a hazard cannot be corrected immediately, the individual should attach a sign or marker which will remain until the condition is corrected. The condition should also be reported to the supervisor. In addition, co-workers and personnel coming on duty should be informed of the hazardous condition. Finally, a report which documents the hazard, its location and any remedial action taken or proposed should be issued.

17. **REPORTING OF INJURIES, ACCIDENTS AND DEFICIENCIES.** All injuries that occur at a Taylor site or while a worker is working on Taylor business must be reported, regardless of the seriousness, to the Rig Site Supervisor. An accident report must be filled out as soon as possible by the Rig Site Supervisor. The report should be signed by the injured person if possible. The Rig Site Supervisor shall notify the office, as soon as is practical, of any injury that has taken place. A copy of the accident report shall be faxed, if possible, directly to either the Operations Manager or Safety Manager on the date of the accident. In case of a fatality or a serious injury requiring hospitalization, the New Orleans office should be notified immediately regardless of what time the accident occurred.

If the accident resulted in an injury or illness leading to a fatality, hospitalization, lost work days, medical treatment, job transfer, termination, or loss of consciousness, an accident summary must be completed. Each location will receive an annual summary of injuries and illness from the Safety Manager. This summary must be posted from February 1 to March 1 and must be maintained for five years.

Reporting procedures for contractors, third party personnel, visitors, or anybody else injured on Taylor's property are the same as those for Taylor employees.

Additionally, incidents of design deficiencies, operating practices, equipment malfunctions/defects, code violations and similar occurrences that can lead to hazards, accidents or injuries should be reported.

Typical examples of incidents that should be reported are:

- a. Leaks of flammable or toxic vapors.
- b. Leaks of fuel, oil or lubricants on walkways or hot surfaces such as heaters and compressor/engine manifolds and exhausts.
- c. Faulty pressure or temperature gauges.
- d. Chemical spills.
- e. Exposed hot surfaces which have damaged or missing insulation.
- f. Safety controls or devices that have been removed or bypassed.
- g. Faulty or damaged ladders, grating, stairs, walkways, or handrails.

- h. Removal of guards from rotating shafts, motors, couplings, pumps, engines or hot or cold surfaces.
- i. Expired calibration dates on instruments and relief valves.
- j. Tools or equipment laying on walkways, stairs, on platforms or on/under ladders in such a fashion that prevents exit or imposes unsafe working conditions.
- k. Removal of chains and/or locks from sealed valves or chained off areas.
- l. Faulty fire extinguishers.
- m. Removal of or the absence of fire extinguishers or detection devices.
- n. Removal of or the absence of warning signs from hazardous areas.
- o. Broken or exposed insulation on electrical wiring.
- p. Open or unlocked electrical switchgear.
- q. Burned-out or faulty lights and faulty warning devices.
- r. Excessive rust and deterioration of masts, substructures, and other load-bearing structures.
- s. Electric code violation through the use of spark-generating equipment in areas that contain flammable vapors.
- t. Breaks in electrical conduits, omission of seals, corroded terminals, water leaks on non-weatherproof electrical equipment, etc.
- u. Openings in decks and floors or pits that are large enough for a person to fall into.
- v. Removal of or the absence of guards or railings from open-sided platforms or stairs.

**18. PREPAREDNESS, ATTITUDE AND BEHAVIOR.**

- a. Before attempting any job, each individual must become familiar with all safety aspects of the job and any peculiarities associated with the particular equipment or operations. This familiarization is especially necessary when personnel are working on new systems/equipment or non-standard procedures. Personnel should not proceed until they are absolutely sure of the appropriate manner in which the task should be done. Personnel should seek advice from their supervisors if there are any doubts.
- b. The job should be approached with a positive attitude, and personnel should not be embarrassed to ask for help or training in regard to the proper way to do a specific job.
- c. Scuffling, practical joking or horseplay of any sort will not be tolerated on the job.

**19. MENTAL AWARENESS AND PHYSICAL CONDITION.** Many accidents and injuries are due to mental sluggishness and fatigue. Individuals should not push themselves to the limits of mental awareness or physical fatigue. Adequate rest and sleep are essential in order to enhance levels of awareness and health.

- a. Personnel's safety or the safety of co-workers must not be compromised by the continuance of work during a hazardous or critical operation when the worker becomes fatigued or mentally sluggish.
- b. Individuals should pace themselves during double tours and scheduled overtime.
- c. Personnel should obtain sufficient rest and sleep before attempting hazardous or critical operations.
- d. Preoccupation with non-work-related matters often causes accidents. Personnel should concentrate on the immediate assignment and should not allow emotional influences to compromise safety.

20. **ALCOHOL AND DRUGS.** No one will be allowed to attempt to perform work, operate equipment or drive a vehicle or vessel when he or she has used alcohol or has a detectable presence of illegal drugs in their system. The unauthorized introduction, possession, or use of intoxicating beverages, illegal drugs, drug-related paraphernalia, narcotics, firearms, explosives, weapons or other hazardous substances is strictly prohibited on Taylor property or work sites and may lead to termination or arrest.
21. **MEDICATION.** Individuals must immediately inform a supervisor if they are taking prescription medication that may affect their ability to work. Any medical information that may be useful during a medical emergency should also be reported to a supervisor.
22. **WORK PERMITS.** No one will be allowed to perform any work that requires permits or special authorization until appropriate permits and/or documents have been issued. The Taylor Rig Site Supervisor is responsible for issuing and monitoring work permits. Examples are "hot tapping," working with radioactive material, welding, grinding, confined entry, etc.
23. **HAZARD COMMUNICATION.** The Taylor Rig Site Supervisor shall ensure that each contractor has a current Hazard Communication Manual in place and in use, complete with MSDS forms for all hazardous chemicals used on the location. It is the contractor's responsibility to ensure that all of his or her employees are aware of all proper handling, disposal, and medical treatment data.
24. **MISCELLANEOUS**
  - a. Smoking will not be allowed in designated "non-smoking" areas or near chemicals or rooms containing chemicals, combustibles, flammable liquids or gases.
  - b. No one should eat near chemicals, radioactive material or toxic substances.
  - c. Running is prohibited unless there is an extreme emergency.
  - d. Gas cylinders and sample bottles shall be used only for their intended purposes.
  - e. Only approved flashlights will be used, and only low-voltage or safety lights shall be used in vessels or wet locations.

- f. All personnel will use proper safety and/or respiratory equipment when handling chemicals and radioactive material. Respirators are required during the handling of most solvents. Gloves, goggles and aprons are required when caustic chemicals are handled or mixed.
- g. Riding on hoists, blocks or crane loads, elevators, or other traveling equipment is strictly prohibited.
- h. Caution should be exercised when drains or direct connections to a pressure vessel or line are plugged. Be sure that system pressure has been bled off.
- i. Operation of tagged valves without proper approval is prohibited.
- j. Pressure should be relieved before hoses are disconnected.
- k. Before closing equipment or vessels, inspect them for rags, tools, and other foreign objects, and remove any such objects.
- l. Bottles, cans and drums of oil, solvent, caustic, and chemicals must be properly labeled. A supervisor should be notified if any such container's label is missing or illegible. If it is possible that the contents may be toxic or corrosive, a sample should to be taken for analysis in order to guide in the proper disposal of the material.

### **3. SAFE WORK PRACTICES**

### **3. SAFE WORK PRACTICES**

#### **3.1 GENERAL**

Taylor Energy Company is dedicated to maintaining an aggressive safety program and is fully committed to providing a safe work environment for employees, service contractors, and visitors. The company's ultimate goal is to minimize and/or eliminate accidents and injuries. In order to accomplish this goal, we have established certain specific safety requirements which are discussed in this section.

All company management and supervisory personnel possess the express authority to suspend any operation which they feel constitutes a hazard to any person, surrounding communities, or the environment. Each supervisor and management staff member has the personal responsibility to ensure the safety of each employee, service contractor, or visitor that is assigned to him or her. Accordingly, each and every person involved has the responsibility to observe and support the company's safety program. It is anticipated that the information contained in this section will contribute to a safer work place. In order for it to do so, Taylor Energy Company requires enthusiastic compliance from all involved parties.

## 3.2 ALCOHOL, DRUGS & FIREARMS

1. No person on Taylor property or in the employ of Taylor is permitted to perform work, operate equipment, or drive a vehicle or vessel when impaired by alcohol or drugs. The unauthorized introduction, possession, or use of intoxicating beverages, illegal drugs, drug related paraphernalia, narcotics, firearms, explosives, weapons or other hazardous substances is strictly prohibited on Taylor's property and will be the cause of immediate termination.
2. Prescription drugs with a fill date of more than one year or those not prescribed to the bearer are illegal in some states. In such instances, the prescription drugs are also prohibited on Taylor's property and will be the cause of immediate termination.
3. Individuals found in violation of this policy will be removed from Taylor's premises immediately, and, if warranted, such individuals will be reported to appropriate law enforcement authorities.
4. To help ensure a safe, healthy, and productive work environment, Taylor reserves the right to carry out reasonable searches of individuals and their personal effects when these individuals enter Taylor premises, while they stay on Taylor premises, and when they leave Taylor premises. Such searches may be initiated by Taylor without prior announcement and will be conducted at such times and locations as deemed appropriate. Random drug testing will be conducted if drug use is suspected. Cooperation is voluntary; however, refusal of an individual to cooperate will be cause for immediate termination.
5. All Taylor employees are responsible for reporting to their supervisor if they feel that another employee, contractor, or anyone else on Taylor's property is in violation of these rules. The Taylor Rig Site Supervisor must report all such suspicions to the Drilling Manager. The Drilling Manager will determine if disciplinary action, drug testing or searches are appropriate. Any such determination will be cleared with the Legal Department.

### 3.3 PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING

1. Hearing protection must be worn in any area posted or suspected of having excessive noise levels. This rule also applies to areas in which excessive noise may occur temporarily, such as areas in which high pressures are released.
2. All contractors and visitors must wear approved safety glasses in any location where the potential for eye injury exists. Contact lenses do not qualify as eye protection; they actually increase the need for eye protection. Special precautions must be taken where risks of liquid spray from hydrocarbons, acids, caustics, etc., may be present.
3. OSHA-approved safety hats must be worn on the location at all times by all contractors and visitors, except when such personnel are inside vehicles, offices, boats and aircraft.
4. Safety-toe shoes must be worn at all times during working hours. Non-slip oil-resistant soles are recommended.
5. Impact-type goggles and face shields should be worn by workers who are chipping, scraping, buffing, grinding, changing dies, using a high-pressure cleaner, etc.
6. Complete-coverage eye protection must be worn when dust hazards exist and when pneumatic tools are used.
7. When cutting with acetylene gas, personnel must wear goggles with #5 or #6 shade lenses.
8. No one should ever look at electric-arc welding without wearing welding helmets or hand shields that are fitted with #10 or darker shade lenses. Cover glasses must be worn with all welding goggles, helmets, and shields.
9. Appropriate gloves must be worn when the potential for hand injury exists. Applicable tasks include pipe and wire rope handling, acids and caustic handling, electrical work, and hot item handling.
10. Since almost all of Taylor's work involves working around moving machinery, hair that is long enough to constitute a hazard must be secured by a net or tied back. Hairstyles that prohibit secure wearing of safety hats are not allowed.

11. Anyone working around tanks or locations where harmful gases, smoke, sprays, etc. are present must wear respirators. No facial hair that may interfere with the wearing of a respirator should be worn..
12. Contact lenses are not permitted when a respirator is required.
13. A climbing belt must be worn at all times while a person is working 10 feet or more above the surface, unless other adequate protection is in place (such as handrails).
14. Clothing that is suited to the work, the weather, and the environment in which the individual works must be worn.
15. All personnel must be fully clothed at all times when they are present at Taylor properties.
16. The wearing of certain jewelry such as rings, watchbands, or neck chains is discouraged due to the hazards presented.
17. When working around moving machinery, remove neckties, neck chains, and baggy, loose, or frayed clothing.
18. If clothing should become saturated with oil, gasoline, or chemicals, the person should immediately wash the exposed skin area with soap and water and change clothes to prevent skin irritation and fire hazard.
19. Each individual must wear a Personal Flotation Device (P.F.D.: Life Preserver) that is correctly fastened during the following activities:
  - a. Transferring to and from (and while on board) marine transportation.
  - b. Working on one-well platforms or well jackets.
  - c. Working beneath decks or outside protective rails.
  - d. Working over water near unguarded edges.
  - e. Going below the cellar deck on offshore platforms.
  - f. Working alone at locations which are over or near water.

### 3.4 ENVIRONMENTAL PROTECTION

1. Each drilling or workover rig must have a formal, written Oil Spill Contingency (OSC) Plan.
  - a. A copy of the plan should be kept with the rig and should be available at all times.
  - b. All members of the rig crew should be familiar with the context of the plan and should be able to locate it at all times.
  - c. Appropriate personnel should be adequately trained to respond should a spill event occur.
  - d. Taylor Energy Company will verify and review each OSC Plan prior to beginning any drilling or workover operations.
2. Drilling and workover equipment will be positioned, to the extent possible, to prevent discharged oil from entering navigable waters.
3. If a spill or other event that threatens the environment occurs, immediate measures should be taken to stop or restrict the event and to keep damage to an absolute minimum.
4. All spills or events that threaten the environment must be reported immediately to the Rig Site Supervisor who is responsible for the particular location. The Rig Site Supervisor will take the necessary steps to control and report the incident.

### 3.5 FIRE PREVENTION

1. All fires on Taylor property, no matter how small, must be reported to management.
2. No attempt should be made to fight fires that are beyond the capability of the fire fighting equipment available on location.
3. The prevention of fires is of utmost importance. Good housekeeping and equipment maintenance practices must be followed to keep fire hazards to a minimum. Keep all areas free of combustible materials and dry weeds.
4. Smoking in operating areas is strictly prohibited, except where specifically designated by management.
5. Approved metal containers must be used for the disposal of oily rags, waste, and other flammable rubbish. These containers must be emptied frequently.
6. Buildings where gas or gasoline are being handled must be well-ventilated.
7. Before an open flame, such as a cutting torch, is carried into a closed building, a test must be performed for detection of the presence of combustible gas. This test must employ properly calibrated, portable air sampling equipment.
8. Due to the dangers of electrostatic charges, high-gravity, high-vapor-pressure hydrocarbon liquids must be stored and transported in metal containers (not plastic or rubber containers).
9. The use of gasoline as a cleaning agent is prohibited. The only flammable liquids approved for use in cleaning machinery are kerosene and varsol, and these must not be used on or near hot surfaces or sprayed around operating equipment.
10. Oil, gasoline, and diesel fuel from leaks should not be burned.
11. Lines containing combustibles under pressure must not be fired to remove ice or paraffin plugs.
12. Do not use aerosol sprays, paint removers, solvents, or other flammables near open flames.

13. Inspect all portable and wheeled fire extinguishers monthly to ensure that they are in place and charged with adequate pressure (if of the pressure-charged design) to be effective. Dry chemical extinguishers with separate pressure cartridges should be checked monthly to ascertain that sealing devices are not broken and fully inspected at the manufacturer's recommended frequency. The use of permanent tags or labels is recommended for maintenance of monthly inspection records.
  
14. Partially discharged extinguishers must be recharged at once or replaced with a fully charged extinguisher and recharged as soon as possible. A discharged or partially discharged extinguisher should be tagged and removed to prevent attempted use for fire fighting. When recharged, the extinguisher should be returned to its designated location.

### 3.6 LOCKOUT PROCEDURES

The following lockout procedure **must** be observed each time a piece of equipment is shut down for maintenance. Lockout in this context refers to electric, hydraulic, pneumatic, mechanical, or any other form of power generation.

1. The appropriate supervisor should be notified of the required maintenance starting time and the expected time of completion before work is started.
2. When working on mud pumps, generators, drawworks, compounds, transmissions, torque converters, compressors, etc., the prime mover **must** be locked out. The term "lock," when used in this and following directions, means to padlock the main switch, breaker, control, or valve using a uniquely keyed lock. The person doing the repair work should maintain possession of the key.
3. Locked out equipment **must** be tagged by the person who installs the lock. The tag should show the date, time, reason for lockout, and the name and title of the person installing the lock. Use each tag only once.
4. Test the lockout method by trying to operate or start the equipment with the lock in place.
5. If more than one classification of worker is working on a piece of equipment, it is preferable if each places a separate lock and tag on the prime mover's locking device before starting work and removes the same lock and tag upon completion of the work. If this is not done, the contractor must have a procedure to assure that the lock is not removed until all work is completed.
6. In cases where the individual worker who starts a job is not the one who completes it, the contractor's safety procedure must assure that adequate communication takes place between tours.
7. The Rig Site Supervisor **must** keep a set of spare keys to the lockout locks under lock and key.
8. No one may cut or otherwise remove any safety lock without the express permission of the Rig Site Supervisor, except the person who installed the lock or that person's relief.

### 3.7 CONFINED SPACE ENTRY

NOTE: Taylor Energy Company Personnel are NOT authorized to enter any confined space without the advance approval of the Operations Manager.

#### ATMOSPHERIC TESTING, PERSONAL PROTECTIVE EQUIPMENT, AND ISSUING OF PERMITS

##### A. General

1. A confined space is any tank, vessel, or similar enclosed area that has a hazardous or potentially hazardous atmosphere and/or a restricted means of entry and egress that is entered by company or contract personnel. A hazardous atmosphere is any atmosphere containing a toxic substance above the OSHA or ACGIH (American Conference of Governmental Industrial Hygienists) recommended exposure levels, whichever is most stringent. A hazardous atmosphere may also contain a combustible gas or an oxygen deficient atmosphere.
2. Confined space is further defined as any tank, vessel, silo, vault, pit or open-topped space more than 4 feet deep (except open-topped spaces whose width is greater than the depth) or any other enclosed space that has one or more of the following characteristics:
  - a. Contains an actual or potentially hazardous atmosphere (i.e. an accumulation of toxic or combustible agents, or an oxygen deficient or oxygen rich atmosphere).
  - b. Makes ready escape difficult (i.e. prevents egress in a normal walking position).
  - c. Restricts entry for rescue purposes.
3. The operating supervisors are responsible for implementing and enforcing the confined space entry program.

## B. Preparation of Confined Space

1. Before entering the interior of any vessel or tank, it shall be drained, washed, purged, and flushed to the extent practical.
2. Blind all necessary flanges or disconnect all lines which may carry harmful agents to ensure that no vapors or fluids can leak into the confined space area. Double block and bleed isolation of equipment is not sufficient for confined space entry. Lockout and tag all necessary pumps, motors, or any other energy source to ensure complete isolation to the confined space. All established electrical lockout/tagout and blinding procedures for equipment isolation shall be followed.
3. The use of purging and mechanical ventilation should be considered prior to entering confined spaces unless conditions prevent its use. Ventilation equipment must be hazard classed for the area it will be used in; for example, Class I Division II explosive proof fans may be required if ventilation is used.

**NOTE:** Special considerations must be given to tanks that are being purged with an inert gas. "Normal" combustible gas indicators will not accurately measure the combustible gas in a tank being purged as it drops from the UEL through the explosive range to the LEL. Special instruments, such as a MSA tankscope, must be used to accurately monitor combustible gas in an "inert" atmosphere.

## C. Testing Confined Space Atmospheres

1. Confined space atmospheres must be tested before entry is allowed. The atmosphere must be tested for oxygen content, flammability (LEL), and any suspected toxic contaminants such as hydrogen sulfide, NORM, etc.
2. In such instances, where entry is required to test the atmosphere, the individual conducting the test shall wear a SCBA (self-contained breathing apparatus) or airline positive pressure respirator with egress bottle. The Respiratory Protection Program shall be followed when using respiratory equipment.

3. All equipment used for atmospheric testing shall be calibrated and operationally checked prior to use according to manufacturer specifications. The atmospheric tests and operational checks that precede the issuing of a permit should be as close as practical to the time the work is to begin and recorded on the entry permit.
  - a. Oxygen content: The percentage of oxygen for unprotected entry into a confined space shall be no less than 19.5 percent nor greater than 22 percent. The oxygen level must be monitored before the flammability test is conducted.
  - b. Entry will not be allowed if LEL is greater than 10 percent.
  - c. Direct Reading Instruments are the only units approved for Confined Space Entry Jobs. Contact your safety manager if you have questions.
4. Portable or fixed DANGER signs must be posted at all point(s) of entry to the confined space which may not be safe for unprotected entry, or where a hazardous atmosphere may accumulate. Signs shall conform to APC specifications and shall state: Confined Space - Entry by Permit Only.
5. Those confined spaces that do not require respiratory protection based on the test results shall be continuously monitored with an oxygen meter during the performance of work. The area must be evacuated immediately if the oxygen content falls below 19.5 percent by volume if proper respiratory equipment is not being used. The area must also be evacuated immediately if the oxygen content rises above 22 percent by volume if proper respiratory equipment is not being used.
6. Continuous monitoring shall also be conducted for toxic gasses and combustible gasses (LEL) which may be released during the course of work. Continuous monitoring for toxic and combustible gasses is MANDATORY on all confined space work regardless of respiratory protection provided. The area must be evacuated if the combustible gasses rise above 10 percent LEL. The area must be ventilated to ensure the LEL is below 10 percent before re-entry is permitted. The confined space is continuously monitored because the LEL may rise above the 10 percent safe level.

D. Confined Space Entry Permits

1. Work in a confined space will not be allowed until a confined space entry permit is completed and a tailgate safety meeting has been held. Permits must have an expiration time. Permits will not be valid for shifts other than the one in which the work started.
2. A copy of the permit shall be retained on file at the local operating center office or field office where the work occurred for at least one year upon completion of the work.
3. Place the permit in a transparent envelope or large ziplock bag at the entrance of the confined space during performance of work.

E. Personal Protective Equipment

1. Company personnel authorized to enter a toxic/oxygen deficient atmosphere shall be provided with the proper respiratory equipment and operating instructions. This equipment shall be checked prior to use to ensure operability. Contract personnel entering a hazardous atmosphere shall provide their own proper respiratory equipment in conjunction with a satisfactory respiratory protection program. Taylor Energy Company will not provide equipment to contractors.
2. Proper personal protective equipment (gloves, goggles, hearing protection, etc.) shall be used where applicable. The safety manager will assist to ensure the proper protective equipment is utilized.

## STANDBY PERSON AND RESCUE

- A. A written rescue plan shall be maintained and followed. The plan shall include, at a minimum:
1. An assessment of the hazard
  2. Personnel required to perform the rescue
  3. Precautions to be taken while in the confined space
  4. Personal protective equipment to be used
  5. Rescue equipment needed
  6. Tools or other special equipment needed
- B. This plan should be reviewed before the permit is initially issued. It is only necessary to review this plan once on those jobs requiring numerous permits to be issued, unless the personnel change.
- C. In all cases of confined space entry, an employee(s) shall be posted outside of the entry exit in order to handle emergencies. Circumstances may require more than one person posted at different access/entry points. The standby man must have proper respiratory protective equipment immediately next to opening with equipment being tested and out-of-case ready for immediate use prior to work commencing.
- D. The standby person(s) shall be in constant communication by the most practical and effective means available with the individual(s) in the confined space. The standby person will have a SCBA or supplied-air respiratory equipment and rescue equipment available at all times in the event of an emergency.
- E. Safety belts and lifelines will be used by persons first entering a confined space that is suspected to have a hazardous atmosphere. These lines shall be attended by a standby person(s). If the area is determined to be safe for entry through atmospheric testing, then the lifelines are no longer necessary.
- F. The standby person must be aware of their responsibilities as a rescue team member and must also be trained CPR and First Aid.

## EMPLOYEE TRAINING

A. Employees must be trained so they know the relevant aspects of safety regarding confined spaces. Training shall include but not be limited to:

1. Type of confined space to be entered
2. Chemical or physical hazards involved
3. Work practices and techniques
4. Atmospheric testing procedures
5. Personal protective equipment to be used
6. Rescue procedures

B. All new employees shall be trained prior to their first confined space entry work. Retraining shall be performed periodically, preferably annually. All training shall be documented and maintained on file at the location.

### References

1. National Institute of Occupational Safety and Health (NIOSH) - Criteria for a Recommended Standard: Working in Confined Spaces, NIOSH Pub. No. 80-106.



## 3.8 HOT WORK OPERATIONS

### GENERAL REQUIREMENTS

- A. A hot work permit must be issued before hot work is performed within 150 feet of an area where combustible or flammable vapors are or could exist in an “upset” condition. Hot work is defined as any work that will generate sufficient heat to ignite combustible and/or flammable materials. Combustible materials are substances that will freely support combustion once ignited. The following activities are examples of hot work; however, there may be more that are applicable at specific locations:
1. Welding
  2. Flame Cutting
  3. Grinding
  4. Portable Heaters or Steamers
  5. Hot Oil Units
  6. Electrical Tools/Equipment (that are not explosion proof or intrinsically safe)
  7. Sandblasting operations (static charges)
- B. The supervisors are responsible to ensure that all work is authorized and permitted prior to starting work regardless of who is performing the hot work.

### HOT WORK PROCEDURES

- A. Obtain authorization from the supervisor overseeing the work before beginning any hot work. Any person may authorize the stoppage of work if there is reason to believe an unsafe condition/situation exists.
- B. The company representative responsible for supervising hot work must complete the hot work permit prior to starting work.

NOTE: A hot work permit is not necessary if gas is going to be introduced for the sole purpose of ignition of the gas to control the hazard. i.e. The lighting of a pipeline leak by a welder.

- C. The permit must be reviewed and signed by the person performing the work, the person authorizing the work, and the person approving the work to ensure his/her acknowledgment of the conditions set forth in the permit. If the hot work is being performed by contract personnel, a copy of the permit must be retained by the contractor's representative at the location where the hot work is being conducted.
- D. The person giving approval that the hot work may begin must ensure that the area is periodically surveyed to ensure the conditions remain suitable for hot work. The work area shall be re-surveyed following all breaks, meals, meetings or other interruptions in the work.
- E. Continuous monitoring should be provided in areas where changing conditions are likely or in high risk areas such as in tanks or in the process areas of plants.
- F. If conditions change so that hot work under a permit expires due to potential danger (i.e., hydrocarbon leak, wind change, lower explosive limit (LEL) reading above 10 percent), etc. no work will be resumed until additional testing is conducted. The source of gas must be determined and the area is again safe to resume work.
- G. Expired hot work permits will be kept on file at the facility for at least one month beyond their expiration date.
- H. Permits will not be valid for shifts other than the one in which the work stated.
- I. Each permit will be dated and will carry an expiration time.
- J. The checking and testing that precedes the issuing of a permit should be as close as practical to the time the work is to be done. The percent of the lower explosive limit will be recorded on the permit. The work area shall be rechecked after any extended break in the job such as meals, coffee breaks, or meetings.
- K. No hot work shall begin if a lower explosive limit (L.E.L.) greater than 10 percent is measured. No exceptions to this rule shall be made. Gas-Trac NGX units or other non-direct reading instruments are **NOT PERMITTED** for hot work or confined space entry jobs. They can only be used for testing of fire boxes prior to lighting.

- L. Combustible gas indicators will be calibrated prior to performing the gas test. If the meter is to be used multiple times throughout the shift it only needs to be calibrated at the beginning of the shift. The calibration results must be documented and filed appropriately at the location.
- M. NOTE: Special considerations must be given to tanks that are being purged with an inert gas. "Normal" combustible gas indicators will not accurately measure the combustible gas in a tank being purged as it drops from the UEL through the explosive range to the LEL. Special instruments, such as a MSA tankscope, must be used to accurately monitor combustible gas in an "inert" atmosphere very dangerous.
- N. When a fire watch is necessary, they must be on duty at all times during the performance of the work.
- O. In the event the hot work will extend past the permit's expiration time, a new permit must be obtained.
- P. Notify company representative responsible for operation of equipment or for supervising hot work when work is complete.
- Q. Hot oil units must be located 150 feet from any combustible or flammable vapor source. When this distance is not possible to maintain, the unit may be positioned closer; however, a hot work permit must be completed before work may begin. When the hot oil unit is within 35 feet of the vapor source, a fire watch must be assigned to the job.

## FIRE WATCH

- A. The operating supervisors are responsible for assigning a fire watch when the welding, flame cutting, grinding, use of portable steamer equipment, etc. is within 35 feet of a potential combustible or vapor source. The fire watch must be trained in the proper use of a cartridge operated fire extinguisher. The supervisor shall review the duties of a fire watch which include:
1. Understanding the location and nature of the hot work.
  2. Survey the area to be sure the necessary fire protection equipment is in place and ready for use.
  3. Survey the area for combustible or flammable materials.
  4. Remain in the area while the work is being performed and remain in constant communication range with person(s) doing the hot work.
  5. Never leave the area for any reason without a replacement.
  6. When bulkheads or walls are involved in hot work, both sides require a fire watch.
- B. The fire watch must be in the ready position at all times when hot work is being performed. The ready position consists of being attentive and having the fire extinguisher in position prior to the start of work. The extinguisher nozzle must be at hand while the hot work is being performed. The extinguisher must be returned to its assigned location when the hot work is complete. The fire extinguisher cartridge must not be punctured unless a fire actually occurs.
- C. The fire watch must periodically survey the area with an explosimeter to ensure the area is suitable for hot work. The work will stop immediately if the combustible gas indicator registers 10 percent or greater of the lower explosive level (L.E.L.) in the atmosphere. Only direct reading instruments are permitted for this work.
- D. The fire watch is authorized to stop the work whenever he/she feels the conditions do not warrant such work. The fire watch is also authorized to stop the work if the work description on the permit is being exceeded.
- E. The fire watch shall be equipped with all needed personal protective equipment needed to perform the work safely, such as properly shaded goggles for working with welders.

## TAIL GATE SAFETY MEETING

- A. A tail gate safety meeting shall be conducted for non-routine hot work jobs and documented by the person supervising the hot work prior to starting work. The meeting will review the following topics:
1. Hot work permit and gas testing/monitoring requirements.
  2. Appropriate emergency procedures and notifications.
  3. Ensure area is free of non-essential personnel, equipment, and vehicles.
  4. Use of personal protective equipment.
  5. Authority and responsibility of fire watch.
  6. Blinding, isolation, and purging of equipment.
  7. Ensure at least two escape routes with easy access are provided if hot work is being conducted in a bell hole or ditch. A second escape route must also be provided, if possible, when conducting hot work in a tank or vessel.

### References

1. Occupational Safety and Health Administration, Department of Labor; 29 CFR 1910.252.D.2
2. National Fire Protection Association, 1989 Supplement 51B.



**TAYLOR**  
ENERGY COMPANY

**DANGER - DO NOT REMOVE THIS TAG.  
TO DO SO WITHOUT AUTHORIZATION WILL RESULT IN  
IMMEDIATE DISCIPLINARY ACTION.**

# HOT WORK PERMIT

Permit Serial No.:	Date:	Start Time:	am/pm	Expires:	am/pm
Equipment to be worked on:				Location:	
Description of Work:					
Job Supervisor:					
Authorized Hot Work Personnel:			Fire watch/Standby Personnel:		
1.		1.			
2.		2.			
3.		3.			
Atmospheric Tests		Initial Readings	Periodic Readings		
Time:					
Explosive (must be less than 10% L.E.L.):					
Other:					
Tester's Signature:					
Indicate measures taken to isolate permit space and eliminate or control space hazards by answering the following questions. (This section to be completed by Job Supervisor)					Yes, No or N/A
1.	Is the equipment to be worked on clean and free of oil, gas and chemicals?				
2.	Are all lines properly blinded or disconnected?				
3.	Are nearby sewers and drains properly sealed?				
4.	Is the equipment sufficiently opened to allow adequate ventilation?				
5.	Are all energy sources de-energized, locked, and tagged?				
6.	Is all equipment properly grounded?				
7.	Is the cathodic protection system de-energized, locked, and tagged?				
8.	Is all equipment suitable for the area conditions and in good working condition?				
9.	Is the area free of combustible or flammable materials, including below the work area?				
10.	Are surrounding conditions, including the atmosphere and wind direction, satisfactory?				
11.	Are authorized work, fire watch, and supervisory personnel properly trained, equipped and positioned?				
12.	Is sufficient firefighting equipment available?				
13.	Is proper personal protective clothing and equipment present?				
14.	Is a CONFINED SPACE ENTRY PERMIT required?				
15.	Are adequate communication procedures in place?				
16.	Have other personnel affected by this work been notified?				
Special Precautions:					
Onsite Emergency Personnel			Offsite Emergency Resources		
Permit is only valid for shift during which work started. This permit should be posted at the site of the work. It should be returned at the end of the permit period to Taylor's authorizing supervisor. If the work is incomplete at that time, a new permit must be issued. Retain all canceled hot work permits for at least 30 days.					
Reviewed by: (Person Doing Work Signature)			Reviewed by: (Person Doing Work Signature)		
Approved by: (Job Supervisor Signature)			Authorized by: (Taylor Supervisor Signature)		
Permit Canceled at (insert time):		am/pm.	Work is(check one): Complete <input type="checkbox"/> Incomplete <input type="checkbox"/>		

### 3.9 HYDROGEN SULFIDE (H<sub>2</sub>S)

#### 1. INTRODUCTION

Hydrogen sulfide is one of the most deadly hazards in the petroleum industry. It is extremely toxic, and it is referred to as H<sub>2</sub>S, sulfurated hydrogen, poison gas, sour gas, or rotten egg gas.

Every worker that can be exposed to H<sub>2</sub>S must have a knowledge of the gas, the way to recognize the presence of the gas, and the proper action to take to avoid exposure. He or she should also have knowledge of first aid for victims overcome by H<sub>2</sub>S and the way to properly handle an emergency situation involving hydrogen sulfide gas.

This section is designed to familiarize workers with possible sources of H<sub>2</sub>S, hazards and characteristics, protective measures, detection, recognition, symptoms, and rescue and first aid treatment involving H<sub>2</sub>S exposure, and, as appropriate, the operation of safety equipment/life support systems. This section is not intended to replace an extensive training and certification program for working in hydrogen sulfide areas.

#### 2. PROPERTIES/CHARACTERISTICS

Hydrogen sulfide is a highly toxic, colorless gas. It is heavier than air, and it has the odor of rotten eggs. It is flammable and can form explosive mixtures in the atmosphere. If ignited, it burns with a blue flame and produces sulfur dioxide, which is a very irritating gas with a pungent odor. Sulfur dioxide is as dangerous as H<sub>2</sub>S.

COLOR	Colorless
ODOR	Very offensive, commonly referred to as having the odor of rotten eggs
SPECIFIC GRAVITY	1.1895 (air = 1.0) (Note:H <sub>2</sub> S is heavier than air.)
BOILING POINT	-76°F
EXPLOSIVE LIMITS	4.3 to 46% by volume in air
IGNITION TEMPERATURE	500°F
WATER SOLUBILITY	Soluble (4 volumes gas in 1 volume water at 32 °F)
FLAMMABILITY	Forms explosive mixtures with air or oxygen

### 3. TOXICITY

Hydrogen Sulfide is extremely deadly at low concentrations. Exposure to 700 parts per million or more can result in death if the exposed person is not rescued and resuscitated immediately—within 3 to 6 minutes.

1 ppm	=	0.0001%	(1/10,000 of 1%)	Can smell
10 ppm	=	0.001%	(1/1000 of 1%)	Allowable for 8 hours of exposure

OVER THE ALLOWABLE CONCENTRATION, PROTECTIVE EQUIPMENT WILL BE NECESSARY.

100 ppm	=	0.01%	(1/100 of 1%)	Kills smell in 3 to 15 minutes. May burn eyes and throat.
200 ppm	=	0.02%	(2/100 of 1%)	Kills smell rapidly. Burns eyes and throat.
500 ppm	=	0.05%	(5/100 of 1%)	Causes loss of sense of reasoning and balance. Respiratory disturbances occur within 12 to 15 minutes. The exposed person needs prompt artificial resuscitation.
700 ppm	=	0.07%	(7/100 of 1%)	The person will become unconscious quickly. Breathing will stop, and death will result if the person is not rescued promptly. The person needs immediate artificial resuscitation.
1000 ppm	=	0.10%	(1/10 of 1%)	Permanent brain damage may result unless the person is rescued promptly.

ppm = Parts of gas per million parts of air by volume  
 1% = 10,000 ppm

#### 4. SYMPTOMS OF EXPOSURE

##### a. Acute

One sniff of a sufficiently high concentration of H<sub>2</sub>S (700 ppm or more) will result in almost instantaneous asphyxia with apparent respiratory paralysis. Acute poisoning or strangulation may occur after even a few seconds inhalation. Inhalation of high concentrations will cause panting, cramps, paralysis and almost immediate loss of consciousness.

##### b. Sub Acute

Exposure to lesser concentrations (less than 500 ppm) usually will result in irritation, principally burning/stinging of the eyes, persistent cough, tightening or burning in the chest, skin irritation, and even unconsciousness. It should be pointed out that there is a very narrow margin between consciousness, unconsciousness, and death. Breathing protection must be worn to prevent exposure to any concentrations greater than 10 ppm.

##### c. Other Effects

There is no way of knowing what will happen when a person becomes exposed to H<sub>2</sub>S. Past history indicates that an individual often becomes hysterical, goes into violent convulsions, and becomes very rigid before collapse. In many cases, the victim is seriously injured as a result of falling after being exposed to H<sub>2</sub>S in the breathing zone.

*NOTE:* Where high concentrations cause respiratory paralysis, spontaneous breathing does not return unless artificial respiration is applied. Although breathing is paralyzed, the heart may continue beating for a few minutes after the attack. It is of utmost importance that artificial respiration be given as quickly as possible and continued until medical aid is available or until the victim resumes natural breathing.

Mouth-to-mouth resuscitation and CPR knowledge should be part of your training. (Remember to use CPR only when there is no pulse.)

## 5. DETECTION METHODS

SMELLING IS NOT A RELIABLE METHOD FOR DETERMINING HOW MUCH H<sub>2</sub>S GAS IS PRESENT. WHEN TESTING FOR H<sub>2</sub>S, BE PREPARED FOR LETHAL CONCENTRATIONS. ALWAYS WEAR A BREATHING APPARATUS.

The nose can detect as little as one part of H<sub>2</sub>S in a million parts of air. However, when concentrations are in the 100-150 ppm range, the sense of smell will be deadened or lost in a matter of minutes.

To determine the amount of H<sub>2</sub>S present, use one of the following means of detection:

Color Metric Tubes are fairly accurate in detecting the presence of H<sub>2</sub>S gas. A given amount of air is drawn through the detector tube. The concentration of H<sub>2</sub>S is registered by the length of discoloration of the chemical inside the glass tube. The accuracy is about ±3% from very low to very high concentrations.

The Tutweiler Method is one of the most accurate methods to measure H<sub>2</sub>S concentrations if the operator is experienced and the sampling is done under ideal or laboratory conditions. Only trained personnel should attempt to test H<sub>2</sub>S concentrations with a Tutweiler tester.

Portable Monitors are used to find low concentrations of H<sub>2</sub>S (500 ppm or less). In some models, the sample is drawn into the monitor with a pump. The H<sub>2</sub>S concentrations are measured and indicated by an LED or a dial. The monitor's alarm can be set to alarm at various concentrations.

Personal Monitors are used by some to warn of H<sub>2</sub>S concentrations in the immediate area of the person carrying the monitor. The alarm is usually set to sound at 10 ppm.

Fixed or Stationary Monitors are often installed on drilling rigs, well servicing rigs, and plants in which concentrations of H<sub>2</sub>S may exceed 10 ppm in the work area. These monitors will detect and alarm when H<sub>2</sub>S concentrations exceed a predetermined level.

Lead Acetate Ampoules or Coated Strips change color in the presence of H<sub>2</sub>S. The degree of color indicates the concentration. These items are not accurate and should be used only as indicators of the presence of H<sub>2</sub>S. Use these items at knee level, not on the collar or shirt front.

## 6. SOURCES

- a. Drilling Operations
- b. Well Servicing
- c. Gas Gathering Lines
- d. Crude Oil Flow Lines, Produced Water Lines
- e. Storage Tanks
- f. Production Processing and Handling Facilities
- g. Gas Plants, Refineries
- h. Sulfur Recovery Plants
- i. Laboratories
- j. Sewers, Cesspools, Septic Tanks, Mines

Certain producing zones contain hydrogen sulfide which is produced with the oil and gas.

## 7. TYPES OF PROTECTION

When working in areas where the atmosphere contains or has the probability of containing concentrations in excess of 10 ppm, one needs some type of breathing protection.

Self-Contained Fresh-Air Breathing Apparatus is the best type for general usage. This type of apparatus provides its own air on demand and can be used for periods of 5-30 minutes. One common type is the escape unit, which can be used for 5 minutes. Another type is the larger rescue unit (Scott Air Pak, etc.), which lasts for 30 minutes.

Air Line Respirators, sometimes known as work units, also supply fresh air from a large supply source such as a compressor or a series of air bottles. An air line respirator is lighter; however, the air line will limit the area that can be covered. This type of equipment is needed for working in H<sub>2</sub>S atmospheres for extended periods.

Canister-Type Full Face Masks may be used if the concentration of H<sub>2</sub>S does not exceed 2000 ppm. There are many pitfalls in using a canister-type mask. For example, the canister may be bad or saturated with H<sub>2</sub>S. The canister purifies the air in the atmosphere and does not supply fresh air. As a result, an improper seal can be fatal. Canister-type masks are recommended only in certain areas where the H<sub>2</sub>S concentration is known to be low and the condition of the canister is good.

Additional training in fresh-air breathing equipment is essential if its use is required. Facial hair (even one day's stubble) can prevent proper sealing of face pieces and is prohibited. Contact lenses should not be worn, since the air dries the eye, causing the lens to stick to the eye. Claustrophobia is a definite hazard when one wears a face piece. Some people will try to pull the mask away from their faces at the worst possible time.

Women will require a special mask due to their high cheek bones. Such problems as lack of teeth, scars, etc. may also result in the need for special masks.

No copper or copper alloy pipe, valve fittings, or gaskets shall be used in H<sub>2</sub>S service or atmospheres. Material requirements for H<sub>2</sub>S service shall meet those specified in the NACE Standard MR-01-75 (Standard for Sulfide Stress Cracking Resistant Metallic Materials for Oil Field Equipment).

## 8. EMERGENCY RESCUE

- a. Put on a breathing apparatus and check the breathing operation before entering a danger area to rescue an H<sub>2</sub>S victim.
- b. Move the victim to an elevated location in a fresh air zone immediately. (Be aware of wind direction; look for air socks, and move upwind or crosswind as required to reach a safe area.)
- c. If the victim is breathing, maintain the victim at rest and administer oxygen if available.
- d. If the victim is not breathing, start artificial respiration or CPR (if the victim has no pulse) immediately.
- e. Call an ambulance to get the person to a hospital or doctor.

- f. Keep the person lying down with a blanket or coat, etc., under his or her shoulders to keep the airway open. Conserve body heat, and do not leave the victim unattended.
- g. If the victim's eyes are affected by H<sub>2</sub>S, wash them thoroughly with clear water; for slight eye irritation, cold, wet compresses are helpful.
- h. Even if the victim has only minor exposure and does not lose consciousness totally, it's best if he or she doesn't return to work until the following day.

9. FIRST AID

- a. Make sure the victim is out of the H<sub>2</sub>S zone before rendering first aid.
- b. If the victim is not breathing, commence artificial respiration. Continue until the victim starts breathing or until you are relieved by medical professionals.
- c. Keep the patient warm.
- d. When breathing is restored, give the patient stimulants such as tea or coffee. **DO NOT LEAVE THE PATIENT UNATTENDED.**
- e. If the victim's eyes are affected, wash them thoroughly with clear water.
- f. Care for any other wounds that were incurred during this incident using the accepted first aid procedures.
- g. Patients overcome by H<sub>2</sub>S should be kept under medical observation until the doctor declares them fit to return to work.

When a person loses consciousness from inhalation of H<sub>2</sub>S, however short the duration of unconsciousness, that person should be examined by a medical doctor before resuming work.

H<sub>2</sub>S goes directly into the lungs and the bloodstream. The body tries to fight it off, but the H<sub>2</sub>S builds up rapidly in the body, and H<sub>2</sub>S poisoning occurs. The nerve centers in the brain lose control of breathing, and then asphyxiation occurs.

The ability to tolerate H<sub>2</sub>S is drastically reduced by special health problems, such as: emphysema, asthma, diabetes, coronary problems, epilepsy, anemia, or eye infections.

Remember, the body cannot fight off a hangover and H<sub>2</sub>S at the same time. Avoid potential H<sub>2</sub>S areas for at least 24 hours following the consumption of any alcohol.

#### 10. PROTECTION AGAINST H<sub>2</sub>S HAZARDS

Working in an H<sub>2</sub>S contaminated or possibly contaminated environment requires certain safety precautions to ensure maximum protection of human lives.

- a. A personnel training program;
- b. Personnel drills;
- c. Adequate and proper placement of safety equipment;
- d. A contingency plan;
- e. Emergency procedures;
- f. Adherence to all safe work practices;
- g. A buddy system.

#### 11. SAFETY MEASURES:

- a. When approaching the job site, take the following precautions to ensure safe entry:
  - 1) Observe "Condition" signs and observe for audio/visual alarms.
  - 2) Check for wind direction.
  - 3) Look for personnel and their activity.
  - 4) Enter the job site slowly.
- b. A minimum of two defined alternate escape routes (preferably roads) should be available.

If an H<sub>2</sub>S emergency occurs while you are on location, move away from the H<sub>2</sub>S source, either upwind or cross-wind, and stay out of the leak area until the situation is returned to normal.

12. SUMMARY OF HYDROGEN SULFIDE (H<sub>2</sub>S) SAFETY PRECAUTIONS TO BE TAKEN WHEN H<sub>2</sub>S IS SUSPECTED OR KNOWN TO BE PRESENT:

- a. Upon entering an area suspected of containing hydrogen sulfide, perform a test to determine the presence of the gas and its concentration (refer to #5 above).
- b. Do not depend on detecting H<sub>2</sub>S by its odor. The sense of smell is rapidly paralyzed by hydrogen sulfide.
- c. "Caution" and "Poison Gas" signs should be used to warn individuals entering a facility or location.
- d. Protective equipment should be readily available to those who work where H<sub>2</sub>S may be present.
- e. Personnel should watch out for each other. Where possible, they should work in pairs. Working in pairs is required in some cases.
- f. Adequate ventilation should be maintained to keep the gas removed from the work area, if possible. Know the wind direction at all times.
- g. Never enter a tank or other enclosed place where H<sub>2</sub>S may have accumulated without wearing proper respiratory protective equipment. If the worker is more than an arm's length away, a safety belt must be secured to a life line and held by a responsible person who is in the clear.
- h. First aid for victims of H<sub>2</sub>S is based primarily on rescue breathing and should follow these general guidelines:
  - 1) Move the victim into fresh air at once.
  - 2) If the victim is unconscious and not breathing, immediately apply mouth-to-mouth artificial respiration and continue it without interruption until normal breathing is restored.
  - 3) Consult a doctor. Victims who have been rendered unconscious must see a doctor even if they have been revived quickly and there appears to be no ill effects.
- i. Shut in the leak source if this action can be done safely.

## **4. TRAINING AND QUALIFICATIONS**

## 4. TRAINING AND QUALIFICATIONS

### 4.1 GENERAL

Taylor Energy Company maintains a comprehensive safety training program for its entire work force. This program has several aspects, including safety handbooks, manuals, initial training, periodic training, and emergency drills. The Taylor philosophy on this subject is quite simple: there is no substitute for adequate safety training. In view of this point, Taylor can expect and will accept nothing less from the contractors that work for them.

It is understood that each contractor has and uses differing training programs for its employees and that these training programs may not be consistent from one contractor to another. The purpose of this section is to ensure that the contractor training programs are consistent with Taylor's philosophies, and, furthermore, that the programs are in compliance with government regulations.

In an effort to promote safety training, Taylor will assist the contractors with training program enhancement whenever deemed appropriate. Specific conditions may require specialized training for the contractor's employees. These cases will be evaluated on an individual basis to determine contractor/operator participation and obligations. It is expected that Taylor and its contractors will maintain open and active communication between one another as technology evolves, practices change, and as improved or modified training media are made available.

As part of the safety training program, each contractor employee will be issued a copy of the Taylor Safety Handbook. All personnel are expected to read, understand, and acknowledge the contents of this handbook. All personnel should sign the acknowledgment form in the handbook and submit it to their supervisor, who will retain it in their personnel file. Each contractor will be issued an adequate supply of the handbooks prior to beginning operations.

## 4.2 INITIAL TRAINING

1. Each new contractor employee that will be working on any Taylor operation shall attend an initial safety training session. The initial training, or orientation program, will be conducted before the new employee begins any work for Taylor.
2. The orientation program should be conducted by a competent, qualified contractor representative. It is preferred that the Rig Site Supervisor be present to underscore Taylor's commitment to safety.
3. The initial training duration, location, and format is left to the discretion of the contractor but approved by the Rig Site Supervisor. The following subject matter should be addressed and thoroughly discussed with each new employee:
  - a. Equipment operating procedures
  - b. Specific job duties
  - c. Hazards potential (H<sub>2</sub>S, blowouts, fires, explosions, etc.)
  - d. Emergency response procedures
  - e. Emergency evacuation plan
  - f. General safety rules
  - g. Specific Taylor requirements unique to the particular location or assignment
4. As stated elsewhere, the new employee should be given a copy of the Taylor Safety Handbook. It is the contractor supervisor's responsibility to ensure that the new employee reads, understands, and acknowledges the contents of the handbook prior to beginning work.

### 4.3 PERIODIC TRAINING

1. All contractor employees working for Taylor Energy Company shall receive periodic safety training on a regular schedule.
2. In an effort to ensure retention of adequate safety skills and knowledge, it is recommended that short, informal safety meetings be held on a daily basis.
3. The frequency of more comprehensive scheduled safety meetings is left to the discretion of the contractor. Taylor should be advised of these safety meetings in advance in order that any safety policy or procedure changes may be presented.
4. Safety training meetings may be broken up into various groups to accommodate all tours, work assignments, days off, etc., but, ultimately, all involved personnel must attend and participate.
5. The Taylor Rig Site Supervisor will attend and participate in as many contractor safety meetings as practicable. The safety meetings should be conducted by a qualified contractor representative. Daily safety meetings may be conducted by the Tour Driller or by the Tool Pusher. The regularly scheduled safety meetings should be conducted by the Tool Pusher, the Drilling Superintendent, the Safety Director, or a member of management.
6. Subject matter for all safety meetings should be varied in order to retain the audience's attention. Some examples of recommended safety subjects are as follows:
  - a. Toxic materials and gases
  - b. Protective clothing and equipment
  - c. Mixing mud and additives
  - d. Working in the derrick
  - e. First aid/CPR

- f. Fire prevention and control
  - g. Lockout and tagout procedures
  - h. Equipment maintenance safety
  - i. Trash burning/disposal
  - j. Hostile environment
  - k. Ladders, stairs, and walkways
  - l. Working in confined spaces
  - m. Equipment cleaning and painting
  - n. Spill prevention procedures
  - o. Equipment operations
  - p. Alcohol, drugs, and firearms
  - q. Tubulars handling
7. In addition to normal and routine safety meeting subject material, all accidents, injuries, failures, pollution discharges, and “near-misses” that occur should be discussed.
8. Written copies of meeting minutes shall be sent to the Taylor’s Safety Manager.

#### 4.4 COMMUNICATION OF CHANGE

1. Any and all safety program operating procedure changes made either by Taylor or the contractor must be effectively communicated to all involved personnel. Various methods to communicate changes include:
  - a. Revisions to manuals and handbooks
  - b. Direct mail-outs
  - c. Safety meetings
  - d. Bulletin board postings
  - e. Paycheck enclosures
  - f. PA system announcements
  - g. Telephone/telefax communications
  - h. Interoffice memos
  - i. Safety award ceremonies
  
2. In an ever-evolving environment such as oil and gas drilling and workover operations, procedural, operating, or safety program changes may be frequent. Some examples of items that may lead to these changes include:
  - a. Accidents/injuries
  - b. "Near-misses"
  - c. Technological advancements
  - d. Government regulation revisions or additions
  - e. Industry standards
  - f. Environmental impact
  - g. Popular consensus
  
3. It is the Taylor Rig Site Supervisor's responsibility to ensure that all changes are communicated to all involved personnel on a timely basis. He is further charged with the responsibility of recommending changes to both Taylor and the contractors as he deems necessary or appropriate.

#### 4.5 QUALIFICATION OF INSTRUCTORS AND CERTIFYING AGENCY

1. Instructors for all aspects of the safety program training should be fully qualified, with certification if available, for the particular training subject at hand.
  - a. Taylor and contractor personnel participating in and conducting daily and regularly scheduled safety meetings should be well versed in all aspects of drilling and workover safety.
  - b. Instructors teaching first aid and/or CPR should be certified by the American Red Cross and re-certified as directed.
  - c. Instructors teaching H<sub>2</sub>S safety should be qualified to teach subject matter aspects as specified by the appropriate state governmental regulatory agency.
  - d. Instructors teaching blowout prevention techniques should be certified by the U.S. Minerals Management Service (MMS), a division of the U.S. Department of Interior.
2. It should be emphasized that obtaining certification or successful completion of the courses as specified above does not qualify one as an instructor; each instructor must be specifically trained and qualified as an instructor in each respective field.
3. It is important that the agency issuing certification is well-qualified. Many companies and agencies offer various advanced training courses relating to drilling and workover operations. Only those agencies and institutions that are accredited and widely recognized and accepted by the industry should be used.

## 4.6 H<sub>2</sub>S CERTIFICATION

1. For all H<sub>2</sub>S environments, either proven or suspected, all on-site personnel should be H<sub>2</sub>S certified prior to entering the location.
2. H<sub>2</sub>S certification in this context refers to successful completion of an approved H<sub>2</sub>S safety course, including issuance of a certificate and/or card offering confirmation.
3. Most H<sub>2</sub>S courses offer various levels of certification; the required level is determined by H<sub>2</sub>S concentration, anticipated duration of exposure, and status within the organization. A recommended guide for determining certification requirements is as follows:
  - a. **BASIC (MINIMAL) H<sub>2</sub>S CERTIFICATION** - This course is normally very simple and is provided only to acquaint the attendee with basic H<sub>2</sub>S facts. Such a course is most frequently used by people who anticipate only short periods on location, such as vendors, drivers, engineers, etc. Such a course serves as adequate training for 0-10 ppm H<sub>2</sub>S concentrations. If a location is marked by a yellow or red H<sub>2</sub>S condition indicator (flag), personnel with only basic H<sub>2</sub>S training should not be allowed to enter.
  - b. **PRIMARY H<sub>2</sub>S CERTIFICATION** - This level of certification is the one most commonly obtained for on-site operating personnel such as roughnecks, roustabouts, pumpers, gaugers, casing crews, well testers, cementers, etc. This course level must be obtained by anyone working in H<sub>2</sub>S concentrations of 100 ppm or greater, and it is recommended for concentrations of 10 ppm or greater (10 ppm is the level at which breathing protection should be worn). Training for this level should include instruction in:
    - 1) The hazards and characteristics of hydrogen sulfide
    - 2) Safety precautions
    - 3) Operation of safety equipment and life support systems

c. **ADVANCED H<sub>2</sub>S CERTIFICATION** - All on-site supervisory personnel should have advanced H<sub>2</sub>S training and certification. This requirement applies to Rig Site Supervisors, Tool Pushers, Drillers, Truck Pushers, Foremen, etc. Training for this level should include all of the above-listed items plus the following additional subjects:

- 1) The effect of hydrogen sulfide on metal components in the system.
- 2) Corrective action and shutdown procedures and, when a well should be drilled, blowout prevention and well control procedures.
- 3) The requirements of the contingency plan, when such a plan is required.

#### **4.7 BLOWOUT PREVENTION CERTIFICATION**

1. All Taylor Rig Site Supervisors and contractor Tool Pushers and Drillers are required to have current, valid blowout prevention certification.
2. Blowout prevention training shall contain elements and procedures as specified in API RP T-6, and certification should be done in accordance with an MMS-approved program.
3. Blowout prevention training will include the issuance of a certificate and/or card upon successful completion of the course.

#### **4.8 FIRST AID CERTIFICATION**

1. Current first aid/CPR certification is required for all Taylor Rig Site Supervisors and contractor Tool Pushers and Drillers.
2. It is Taylor policy that at least two personnel on each tour are certified in first aid/CPR.
3. Successful completion of an approved Red Cross first aid/CPR course shall be verified by the issuance of a certificate and/or card. Refresher training should be scheduled to maintain the validity of certifications.

## 4.9 DOCUMENTATION

1. All safety meetings shall be documented, and records shall be forwarded to and retained at the Taylor corporate office.
  - a. Daily safety meetings will be reported on the Taylor Daily Drilling Report, and will include a list of the attendees.
  - b. Regularly scheduled safety meetings will be recorded in the form of minutes, which will list all discussion topics, questions and answers, specific areas of concern, accidents, injuries, "near-misses," and the names of the attendees.
2. In addition to the certification wallet cards to be retained by personnel, a copy of all H<sub>2</sub>S, blowout prevention, and first aid/CPR certificates shall be kept on file at the Taylor corporate office.

## **5. OPERATIONS PROCEDURES**

## 5. OPERATIONS PROCEDURES

### 5.1 GENERAL

This section covers drilling, workover, and associated service operations performed by the various contractors utilized by Taylor. These contractors have been retained by Taylor to perform specific functions. This fact alone states that they are well qualified to do their jobs; otherwise, they would not have been selected. Therefore, the purpose of this writing is not to tell them how to do their jobs, but, rather, to guide them in how to do their jobs safely.

This section has been specifically designed for application to a broad range of operations. The safety standards are more "task-oriented" than "job-oriented." For instance, while there is no topic specifically designated for cementing operations, the subjects of mechanical hazards, vehicular operations, high-pressure systems, etc., will be applicable. Nevertheless, for certain operations that present unique problems or safety hazards, specific sub-sections are provided, such as those dealing with workover operations and offshore operations.

The drilling and workover industries have developed rather generic operating procedures for most types of operations. Specific tasks cannot be performed in very many different ways. Thus, these procedures are offered mainly as a reinforcement to the contractor's own safety program. Nevertheless, if it is found that a contractor's safety rules do not comply with this program, Taylor's safety practices will supersede the contractor's. If such a case is found, it is the Taylor Rig Site Supervisor's responsibility to immediately notify the contractor and to make every effort to enforce compliance as soon as possible.

It is anticipated that all of Taylor's contractors have safety programs in place and in use that parallel Taylor's philosophies. It is expected that any areas of disagreement between these programs will be effectively and quickly resolved. We should not lose sight of our ultimate goal, which, as stated throughout this manual, should eliminate accidents and injuries.

## 5.2 MECHANICAL HAZARDS

1. All exposed rotating or moving components, such as fans, shafts, sheaves, sprockets, etc., shall be provided with adequate shielding or guards.
2. Lockout and tagout procedures shall be followed when equipment that presents mechanical hazards is being serviced or repaired.
3. Any guards or protective devices that have been removed to accommodate maintenance or repairs should be replaced prior to returning the equipment to service.
4. All personnel should be adequately trained in equipment shutdown procedures in the event of an emergency.
5. Personnel should not ride on traveling equipment under any circumstances.
6. Leaks of oil, water, mud, hydraulic fluid, and fuel should be repaired immediately. Engines with fuel leaks shall not be operated under any circumstances.
7. Machinery and equipment repairs, service, and maintenance will be performed only by qualified personnel. Machinery and equipment should not be worked on while in operation.
8. The Driller's Control Station should be attended by qualified personnel whenever the drawworks, rotary table, and related equipment are in operation.
9. Hoisting, traveling, rotating, and handling equipment should not be modified from the original manufacturer's design and intent.
10. Pins, bolts, nuts, keys, dies, handles, springs, and other such replaceable items should be checked frequently for damage, wear, or other degradation. Damaged or missing components of this type should be replaced immediately with like items.
11. Drill floor equipment and tools should be properly stowed and/or secured when not in use. The drill floor should be kept clean and orderly at all times.

12. Catheads should have anti-fouling devices in place and in use at all times. A qualified operator should attend the driller's control station whenever a cathead is in use to disengage in an emergency. Only hemp or manila rope should be used on catheads, and the rope should be removed from the cathead and stowed when not in use. A qualified spotter should be used when the cathead operator cannot see the load. Lifting personnel into the derrick with the cathead is strictly prohibited.
13. Tongs should be counterbalanced only with approved counterweights. Add-on weights such as tools, bits, junk, etc., should not be used. Counterweights should be restricted, confined, or secured with a safety cable.
14. Extreme caution should be exercised by personnel working on the drill floor while the rotary table is in operation. The rotary area should be provided with a non-skid cover or material.
15. All decks, platforms, walkways, and raised floors that are more than four feet in height should be provided with adequate handrails.
16. The derrick should be equipped with an approved escape device and a safety climbing device. Personnel climbing or working in the derrick or at a height of ten feet or greater in an area without walkways and handrails are required to use a safety harness and tail-rope.
17. Personnel are prohibited from being in or on the mast while it is being raised or lowered, or when stuck pipe is being pulled or jarred.
18. Drill line shall be slipped and cut as specified by the wire rope manufacturer.

### 5.3 ELECTRICAL HAZARDS

1. UNAUTHORIZED (UNTRAINED) PERSONS WILL NOT ATTEMPT TO MAKE REPAIRS ON ELECTRICAL EQUIPMENT.
2. All personnel should know the location of electrical switches and controls in their applicable work areas and should be fully instructed in proper usage.
3. Personnel should avoid stepping on or handling live wiring, lights, or electrical devices that are lying on the ground or on floors. Power should be turned off, and these items should be returned to their proper places.
4. Defective or damaged electrical cords, wires, and cables should be repaired or replaced. Splicing or cutting by unauthorized personnel is prohibited.
5. Switches and controls on electrically powered equipment should be locked out and tagged for maintenance and repairs.
6. Safety alarms, fuses, or controls should not be bypassed or disabled.
7. Main disconnects and breakers should not be used for stopping motors except in an emergency. These items are also not to be used for starting motors under any circumstances.
8. All unsafe electrical lines, devices, and tools should be reported, tagged, and removed from service until repairs can be made.
9. Water or steam should not be used to wash areas near motors or other electrical equipment unless power is turned off and locked out.
10. Only approved solvents (such as methyl chloroform) should be used for cleaning electric motors or equipment.
11. Electrical outlets should not be overloaded and must be grounded. Electrical outlets' breaker sizes should not be increased to levels above their rated capacities.
12. Only three-prong electrical plugs or other appropriate devices should be used. The use of two-prong electrical adapters is prohibited.
13. All batteries should be adequately ventilated to prevent accumulation of explosive vapors.

14. Before working on enclosures, switches, starters, motors, or other electrical equipment, personnel should touch the component with the back of their hand. Personnel should NEVER use the inside of their hand or grip the equipment. Using the back of the hand will prevent electrical shock from causing the muscles to contract and causing the hand to grip the equipment.
15. Personnel should never stand in water while touching electrical cords, plugs, lamps, power tools, etc. Hands, shoes, and clothing should be dry when one handles energized electrical equipment.
16. Portable hand lights and flashlights that are used in hazardous areas must be explosion-proof. Globes, guards, and lenses should be undamaged and in place.
17. Extension cords should be disconnected from the power source before being rolled up. Disconnect the cord by pulling on the plug instead of the cord.
18. Personnel should stand to the hinged side of electrical panels when energizing circuits, starting equipment, or opening enclosure doors because flashovers can occur.
19. All non-current-carrying enclosures or structures used in electrical hardware or circuits must be individually grounded or bonded. In a grouping of electrical hardware, the grounds must be interconnected. Electrical motors must be grounded in accordance with the National Electric Code (NEC) to a 5 ohm minimum ground. Before working on electrical equipment, personnel should visually determine if ground is present.
20. Doors and covers of electrical enclosures should be kept closed except while repairs are being made. Doors on external enclosures should be secured open when repairs are being made to keep wind from slamming them shut.
21. If an enclosure or frame is found to have an electrical charge, a qualified electrician should be notified immediately to make repairs.
22. Switches or circuit breakers that are open to permit work on electrical equipment must be visually checked to ensure that they are not energized. If there is any doubt, call the electrician.
23. Approved non-conductive floor mats should be provided for personnel to stand on while operating switch panels. The mats should be of sufficient width, thickness, and length to allow operation of the entire panel. Mats should be kept clean, dry, and free of oil.

24. All high-voltage panels should be clearly marked "DANGER - HIGH VOLTAGE - KEEP OUT." Automatic start/stop equipment should be clearly marked with appropriate warning signs.
25. Rig lighting should be maintained as follows:
  - a. All rig lighting fixtures should be equipped with safety cables or fasteners and globe/tube guards.
  - b. All broken or burned-out bulbs should be replaced as soon as possible.
  - c. Protective globes should not be removed from explosion-proof or vapor-proof fixtures unless the circuit is de-energized.
  - d. Vapor-proof globes and guards should be kept in place and in good repair on fixtures.
  - e. Explosion-proof fixtures should be used to illuminate the well bore.
26. Users of electric power tools will follow these guidelines:
  - a. All electrical power tools should be properly grounded with a third wire or double-insulated (UL). Electrical outlets that are used either outside or in wet locations shall be equipped with UL or FM listed or labeled ground-fault circuit protection.
  - b. Powered hand tools should not be equipped with locking devices on the trigger or handle.
  - c. Only electrical power tools that are approved for such use should be used in gaseous or explosive atmospheres.
  - d. Manufacturer's recommendations should not be exceeded when one uses electrical power tools.
  - e. All electrical power tools should be turned off before the power supply is connected or disconnected.

27. Personnel should use extreme caution when working near or under electric power lines to prevent pipe, gin poles, guys, cranes, or other objects from touching the power lines. If mobile equipment comes in contact with power lines, the following guidelines should be observed:
- a. The equipment operator should remain on the equipment until the power lines are de-energized.
  - b. Personnel should not approach or touch the equipment until the power is turned off.
  - c. If the operator finds it absolutely necessary to leave the equipment, he or she should jump off to avoid touching the ground and the equipment at the same time.
28. In addition to the safety procedures specified throughout this section, the following guidelines will apply, particularly when one replaces or checks fuses and circuit breakers:
- a. Electricians' gloves should be worn. These gloves should consist of both a rubber inner liner and an outer leather gauntlet. Gloves should be air-tested before each day's use to assure their integrity.
  - b. Personnel should ensure that the power is off before opening the box. No attempt should be made to bypass or "cheat" safety disconnect features.
  - c. Only authorized personnel should replace primary fuses such as transformers, disconnects, and line fuses.
  - d. Fuses should be removed only with an approved fuse puller. Pullers should be kept clean and dry.
  - e. Fuses should be tested at an area separate from the fuse box. Fuses are never to be tested in the box.
  - f. Replacement fuses must be of the exact same rating as the defective fuse. Personnel should ensure that replacement fuses are firmly locked in their clips.
  - g. The use of pennies, slugs, tin foil, wire, or other non-approved substances as a fuse replacement is strictly prohibited.

- h. If replacement fuses continue to blow, or if the starter still will not operate, the box should be locked out and tagged, and a qualified electrician should be notified immediately.
  - i. The use of renewable element fuses below 100 amperes is prohibited.
  - j. On circuit breakers that are equipped for reset, personnel should ensure that the motor starter is turned off prior to resetting.
  - k. Circuit breakers should operate firmly and smoothly. If they do not, they are probably dirty and/or corroded and should be cleaned and overhauled by a qualified electrician as soon as possible.
  - l. Personnel should stand to one side and look away when resetting a breaker because flashover may occur.
29. For obvious hazardous operations, tail-gate safety meetings (discussions) will be conducted to assure adequate knowledge of the hazards for all workers.
30. No hot work should be permitted without a Hot Work Permit signed by a Taylor supervisor.
31. Shorting wires shall be installed between all terminals of inactive or stored capacitors and transformers.

## 5.4 HIGH-PRESSURE SYSTEMS

1. High-pressure lines and their associated hardware and fittings should be checked frequently for signs of wear, damage, kinking, abnormal vibration, or leaks.
2. High-pressure safety relief devices should not be bypassed or disabled. Each mud pump should be equipped with a safety relief valve. Only approved and properly sized shear pins should be used in safety relief valves.
3. All high-pressure systems, including mud, air, hydraulic, cement, etc., should be provided with pressure gauges. All pressure gauges should be operational and should have clear, transparent lenses. Gauges with cracked, missing, painted, or opaqued lenses should be replaced immediately. All mud pumps will be equipped with mud pressure gauges, and the mud stand pipe will have a mud pressure gauge that is visible from the driller's position.
4. No maintenance or repairs should be performed on "live" or pressurized lines. If leaks are detected at hammer union connections, the line should be depressurized before one attempts to tighten the connection. It should never be assumed that a pressurized line has been bled off or depressurized.
5. All high-pressure lines and hoses that are subject to vibrating or "kicking" should be secured with safety chains and hobbles.
6. Extreme caution should be exercised when one replaces components on a high-pressure system. It must be ascertained that additional or replacement components are of an equal or higher rating than the system.

## 5.5 TUBULARS HANDLING

1. Loading or unloading tubulars with a fork lift should be done one layer at a time. Fork lifts' rated capacities shall not be exceeded during loading or unloading, and the operator should give consideration to location conditions at the time.
2. Loading or unloading tubulars with a crane should be done through the use of a spreader bar and/or choker-type slings. Tail rope shall be attached to crane loads to control the load. The crane operator should set the load down to stop the swinging action before placing tubulars on racks, a truck, a barge, or a boat.
3. Tubulars should be rolled one at a time. When tubulars are stacked in layers, care must be taken to keep wood stripping from kicking up and striking personnel. Tubulars should be fully chocked when on racks.
4. Drill pipe that is picked up from the catwalk shall have at least two wraps with the pickup line, and the hook should be placed with the open side facing away from the pipe. Pickup lines should be visually inspected each time a lift is made. Personnel should stand to the side of the pipe as it is being lifted in case the line breaks or slips.
5. Tubulars that are staged in the V-door should be properly secured to prevent shifting.
6. Tubulars that are lifted to the drill floor should not to be allowed to swing while the lower end clears the floor.
7. When tubulars are being racked, personnel should exercise great caution, keeping their feet out from under the pipe and not getting between the moving pipe and the racked pipe.
8. When picking pipe up or laying pipe down with a laydown machine, crew members must keep their bodies and hands out of the way of the laydown bucket.
9. When laying pipe down, a crew member should ensure that all personnel are clear before the elevator is unlatched.
10. Two sets of tongs should be used to make up and break out all connections. Tong snub lines and tong cylinders must be kept in good operating condition.

11. Spinning chains should be operated only by personnel who have been properly trained in spinning chain use. An approximately 9-inch long braided rope handle must be attached to the end of the chain. All involved personnel should exercise extreme caution when a spinning chain is in use. The driller must be constantly prepared to stop the cathead in the event of an emergency. Spinning chains should be kept in good repair at all times. The use of old lift chains as spinning chains is prohibited.
12. Drill collars should be handled one at a time due to their extreme weight and should be handled with lift subs. Air hoists should be used for moving lift subs.
13. No part of the body should be placed under a drill collar clamp when such a clamp is being installed on a drill collar in the rotary table.

## 5.6 WELL CONTROL

1. Blowout preventers, choke manifolds, BOP closing units, and other related well control components should be in accordance with API RP 53 and state regulatory requirements.
2. Taylor Energy Company reserves the right to specify well control equipment that exceeds the recommendations of API RP 53 as specific requirements and applications warrant.
3. Blowout preventers should be function-tested before every trip in or out of the well. Blowout preventers should be pressure tested before the surface casing is drilled out and each time the stack is nipped down and reassembled. Documentation of the method and procedures used to verify that all rams, valves, and auxiliary equipment were tested will be recorded on the morning report. Failure of any portion of the well control equipment will be reported immediately to the Rig Site Supervisor and preparations made for immediate repair of same.
4. Field welding on blowout preventers and related well control equipment is prohibited. The Rig Site Supervisor should be consulted before any repairs to the well control system are made..
5. Closing unit accumulators should be nitrogen-charged by qualified personnel to the manufacturer's specifications. Nitrogen charges should be checked frequently.
6. All controls on the closing unit should be clearly marked according to their exact functions. Control locking devices should be in place and operational. Blind ram or shear ram controls on remote and main closing units should have removable guards to prevent accidental activation.
7. Closing unit hydraulic lines should be completely bled off prior to disconnection.
8. Closing units should be located at least 100 feet from the wellhead.
9. Appropriate scaffolding, safety belts and other personnel devices should be used for assembling or disassembling blowout preventer stacks.

## 5.7 DRILLING MUD/CHEMICAL HAZARDS

1. All chemicals, including drilling mud and additives, should be properly labeled in accordance with their contents and hazards. Removal of labels is prohibited.
2. All contractors should obtain and retain copies on location of Material Safety Data Sheets (MSDS) for all hazardous chemicals used in their operations.
3. Contractor employees should be advised of the location of the MSDS forms and their right to review them.
4. Contractors are charged with the responsibility of developing and maintaining their own Chemical Hazard Communication Programs (HazCom) and of adequately training their employees on this subject.
5. Personnel should be properly trained for mixing drilling mud and additives.
6. Extreme caution should be exercised when chemicals are mixed. Ingredients should be added slowly to avoid splashing.
7. Caustic should be mixed in a specific tank or barrel. The container should be filled with water first, and caustic should then be slowly added. ONLY the additives that are approved for introduction into the caustic solution are allowed.
8. Proper protective clothing and equipment should be used when drilling mud, chemicals, and caustic are mixed. Mixing stations should have available eye protection, face protection, respiratory protection, rubber gloves, rubber aprons, and eyewash stations.
9. Areas where mud and chemicals are stored or mixed should have appropriate warning and danger signs.

## 5.8 INCLEMENT WEATHER OPERATIONS

1. Personnel should always check on expected daily weather conditions and dress accordingly.
2. Clothing should be protected from wetness, both externally (rain and wet snow) and internally (perspiration). Wet clothing does not provide adequate insulation, and heat loss is much greater through wet clothing.
3. During extremely low chill factors, a wool knit liner or face mask should be worn in a safety hard hat to prevent rapid heat loss from the head.
4. During storm watches and warnings, if it is necessary to travel to a remote location, notify the supervisor or fellow employee of the intended route and timing.
5. During thunderstorms, personnel should stay in a vehicle/boat or indoors and avoid high places and conductive objects.
6. Personnel should know the symptoms of hypothermia (excessive loss of body heat). These symptoms include poor coordination, stumbling, poor judgment, extreme fatigue, numbness, disorientation, and bluish or puffy skin. To prevent hypothermia, personnel should get adequate rest, eat regularly and make sure that their clothing and outer wear are windproof and waterproof. One may reduce perspiration by dressing in layers of clothing and putting on (or removing) layers as the weather and the amount of physical activity change. Personnel who have hypothermia should be moved out of the cold, and their wet clothing should be removed. Personnel should drink hot fluids (but not alcoholic fluids), exercise if feelings permit, and get a hot bath or shower.
7. Personnel should know the symptoms of frostbite. These symptoms are white to grayish-yellow skin, a numbing feeling or pain that quickly subsides, and areas with no feeling at all. To prevent frostbite, personnel should dress warmly and keep all exposed areas well covered. To treat frostbite, personnel should be moved out of the cold. Frostbitten areas should be wrapped with blankets or woolen material. Frostbitten areas should never be rubbed. Lukewarm water is acceptable, but never use snow, ice, hot water, heat lamps, or flame to warm frostbitten areas.
8. Hurricane procedures are addressed in the "Hurricane Evacuation Plan."

## 5.9 OFFSHORE OPERATIONS

1. Offshore platforms and drill vessels should have Emergency Action Plans, known as Station Bills, in effect and conspicuously posted throughout the unit. The unit operator or owner should maintain the Station Bills, and all on-board personnel should read, understand, and know their assignments and duties as described in these plans.
2. Offshore facilities should be equipped with general alarm systems. Such a system must function throughout the facility, either by audio and/or visual means, depending on specific applications.
3. All offshore personnel should be adequately trained for offshore operations and the associated potential hazards. Emergency routine personnel training should include emergency drills in accordance with Section 6 of this manual.
4. During personnel transfer operations, helicopter and vessel pilots and operators are in complete charge and are responsible for their personal safety and the safety of passengers. They will make all decisions concerning the aircraft or vessel, and their authority should not be challenged.
5. Vessel transport procedures are as follows:
  - a. All boats utilized to support Taylor operations should be equipped and operated in accordance with USCG rules and regulations.
  - b. Only qualified and authorized personnel should operate a boat.
  - c. Personnel should wear Personal Flotation Devices (PFDs) when working or riding on the deck or a boat or barge, or when transferring between vessels or to a platform.
  - d. Boat passengers should ride inside the cabin and remain in their seats while underway. Passengers should not embark or disembark until the boat is secured and the engines are shut down.
  - e. Persons judged by the boat operator to be under the influence of alcohol or drugs should not be transported.

6. Helicopter transport procedures are as follows:
  - a. Personnel should be adequately instructed on helicopter safety prior to boarding. First-time helicopter passengers should notify the pilot.
  - b. Personnel should not remain in the vicinity of the helideck or helipad during landings and take-offs or while waiting for a helicopter. Personnel should remain in a designated area until signaled by the pilot to board.
  - c. Personnel should wear seat belts and lifesaving equipment when on board, and they should not release seat belts or remove equipment until notified by the pilot to do so. Passengers should not move about the cabin during flight.
  - d. Smoking is not permitted on the helideck, on the helipad, or aboard the aircraft.
  - e. Personnel should stay clear of the tail rotor at all times.
  - f. Persons judged by the helicopter pilot to be under the influence of alcohol or drugs should not be transported.
  - g. Crane operations should cease during landings and take-offs. The crane operator should shut down and step outside the cab so he can be seen by the pilots.
7. When transferring to or from a facility by means of a swing rope, net, or basket, all personnel should wear securely fastened PFDs or work vests. Only four people should be allowed on a personnel basket at one time. Personnel should hold on with both hands. Persons transferring for the first time should advise the appropriate personnel and be instructed on how to proceed.
8. Each offshore facility should be equipped with an adequate quantity of life rings, immersion suits, life boats, life rafts, survival capsules, life preservers, Personal Flotation Devices, and/or other life saving equipment as dictated by specific applications. All personnel should be properly trained concerning life-saving equipment locations, use, and maintenance.
9. General requirements as specified throughout this manual are applicable to offshore operations.

## 5.10 WORKOVER OPERATIONS

1. Workover rigs should be equipped with internal load guylines and external wind guylines in accordance with the original manufacturer's specifications. Guyline patterns and anchors should be set up in accordance with the original manufacturer's specifications. If the manufacturer's specifications are not available, masts should be guyed in accordance with API Spec. 4E and 4F.
2. Adequate footing should be provided to support the rig and anticipated loads. Loads should be distributed in accordance with the manufacturer's specifications. Before mast erection, rigs should be completely leveled, and leveling jacks should be locked in position.
3. All air should be bled off before hydraulic mast raising and telescoping ram operation. The mast should be checked periodically when in the telescoped position to ensure that any entrapped air in the telescoping ram(s) has not expanded and lifted the mast's upper section off of the load pawls.
4. Masts should not be raised in adverse weather conditions such as high winds, storms, snow, etc.
5. With the exception of the rig operator, all personnel should stand clear of the rig during mast raising, telescoping, and lowering operations. Personnel should not be allowed in the rig cab during mast raising or lowering operations.
6. Workover rigs should be equipped with fail-safe features on the leveling jacks, raising ram(s), and telescoping ram(s) hydraulic circuits to prevent operation of these controls while the rig is in operation. A diverter valve is preferred. This type of valve disables the rig-up hydraulic circuit and activates the operating circuit.
7. If the rig is spotted on the well incorrectly, the mast must be lowered before the rig is moved and respotted. Under no circumstances is the rig to be moved with the mast raised. Guylines should not be used to pull the crown over the well.
8. The mast should be checked before any loads are applied in order to ensure that the upper section is properly seated on load pawls. If the mast is equipped with a folding or otherwise movable ladder, such a ladder should be checked to ensure that it is fully folded out or seated before personnel are allowed to climb it.

9. The rig should be equipped with a personnel escape device for the Derrickman. The escape device should be properly anchored and equipped with a brake. It should be attached either to the racking platform or the rod hanger, depending on where the Derrickman is working. The mast should be equipped with a safety climbing device, and the Derrickman should use a safety harness and tail-rope when climbing or working in the derrick.
10. The mast crown should be equipped with a crown safety platform with handrails.
11. Before the mast is raised, it should be checked for loose objects such as bolts, nuts, pins, tools, branches, etc.
12. All loose objects on the rig should be stowed or secured before the rig is moved. Guylines should be rolled up and secured. Components should be secured with chains, cable, or wire; soft rope should not be used.
13. Pipe or tubing that is racked in the derrick should be secured with chains or cable as each row is filled.
14. All rigs should be equipped with operational, accurate weight indicators.
15. Guylines and anchors should be visually inspected whenever 75% of the rated hook load or winds in excess of 40 mph are encountered. Inspections should be documented on the daily rig report.
16. Workover operations should be restricted to daylight operation unless the rig is fully equipped for night operations. For night operations, generators, lights, required beacons, etc., are required.
17. Workover rigs should be inspected at intervals designated by the Well Servicing Engineer.
18. General requirements as specified throughout this manual are applicable to workover and related operations.

## 5.11 RIG UP / RIG DOWN

1. Heavy equipment utilized during rig up and rig down operations, such as cranes, fork lifts, winch trucks, and transport trucks, are only to be operated by properly trained and qualified personnel.
2. Spotters should be used during loading, unloading, or load moving operations that involve any vehicles or heavy equipment items.
3. Equipment operators should follow the signals given by the spotter. Nevertheless, the operator should comply with anyone giving the signal for an emergency stop.
4. Manufacturer's maximum rated capacities should not be exceeded when equipment is lifted or moved.
5. Personnel are not allowed to be under suspended loads or between a winch truck and its load.
6. Personnel working at elevations of ten feet or greater during rig up or rig down should use safety harnesses and tail-ropes.
7. Guide pins must be in place when personnel are tail-boarding equipment with a winch truck.
8. Rig up and rig down operations should be restricted to daylight hours only.
9. Cables, hoses, piping, etc., should not be run on ground until operations that present crushing hazards have passed.
10. Removable stairs, walkways, floor plates, and deck plates should be installed and secured as soon as possible during rig up and rig down operations.
11. Particular attention should be given to ensuring that all pins are installed, that they are of the proper size and length, and that they are securely locked in place with a safety-pin-type securing device.
12. When rig up is complete, all components should be closely examined for function, leaks, overheating, unusual noises, and excessive vibrations. Any observed problems should be corrected before operations begin.

13. Prior to and during derrick-raising operations, the following procedures will apply:
  - a. Loose objects in the derrick should be removed or secured. Tong counterweights should be positioned in their lower-most positions.
  - b. Engines should be started and brought up to operating temperatures. Ensure that engines have an adequate fuel supply.
  - c. Function test the drawworks brake system.
  - d. Check around the derrick legs, shoes, feet, A-frame, bull lines, etc., for obstructions that might impede derrick raising.
  - e. Lubricate all raising sheaves, rollers, pins, etc.
  - f. Ensure that the deadline is firmly secured to anchor.
  - g. One man should be situated at the engines as a backup throttle operator, and one man should be stationed near the drawworks operator as an emergency standby.
  - h. The derrick should be raised slowly and cautiously, with the drawworks transmission in low gear.

## 5.12 VEHICULAR OPERATIONS

1. All vehicles entering Taylor locations must have required registration documents and proof of insurance.
2. All operators of vehicles on Taylor locations should have valid drivers' licenses that are authorized and issued for the type of vehicle they are operating.
3. Any vehicular accident on a Taylor location, major or minor, must be reported as soon as possible to the Rig Site Supervisor, who will notify the Taylor corporate office.
4. Vehicles that are equipped with catalytic converters should not be driven or parked over grass, trash, oil spills, or where gas accumulation is possible.
5. All vehicles on a Taylor location should be operated slowly and in a safe manner, and drivers should exercise caution and good judgment.
6. If visibility is hampered or obscured when one operates a vehicle, a spotter should be used.
7. Vehicles should not be operated on Taylor locations by drivers under the influence of drugs or alcohol or those taking prescription medication which contains a warning against vehicle operation or possible drowsiness.
8. No one should be permitted to ride on the outside of any vehicle when it is motion. This guideline encompasses riding on trailers, loaded equipment, truck running boards, and/or fork lifts.
9. Vehicles should not be left unattended with the engines running, unless required for attendant operations.
10. Routine vehicle maintenance (oil changes, wash jobs, lubrication) is prohibited on Taylor drilling locations. Only the emergency repairs that are necessary to vehicular operations, such as repairing a flat tire, will be permitted.
11. Vehicle jump-starting is not allowed within 100 feet of a well. Vehicles within 100 feet of the well that require jump-starting will have to be pushed or towed to a safe distance.
12. Vehicle refueling is not permitted within 100 feet of potential ignition sources such as engine manifolds, pilot lights, generators, etc. Engines must not be running during refueling operations.
13. Vehicles should be parked away from the general vicinity of the rig. For instance, a vehicle may be parked next to the crew quarters, tool pusher's house, or Rig Site Supervisor's house. Vehicles that must be in close proximity to the rig, such as service or delivery vehicles, will be allowed to remain in the area of the rig only as long as necessary.

14. Vehicles should not be operated on Taylor locations with the doors open. Entering or exiting a vehicle in motion is strictly prohibited.
15. All containers, tools, parts, supplies, and other similar objects should be properly secured on or in vehicle prior to vehicle operation.
16. All trucks of one-ton capacity or greater operating on a Taylor location should be equipped with fire extinguishers, first aid kits, and appropriate emergency equipment.
17. Loaded trucks entering or leaving a Taylor location should have their load securely tied down with approved chains, boomers, straps, or other devices. All mud, dirt, rocks, trash, boards, or other debris should be removed from truck, trailer, and load prior to departure. Fluid tanks should be either drained or plugged prior to loading and transport.
18. Personnel should stand clear of truck winches, winch lines, chains, gin poles, rollers, etc., when truck is loading, moving, or unloading equipment.
19. Appropriate warnings and proper documentation should be displayed and maintained in trucks that haul hazardous or dangerous materials to or from a Taylor location.
20. All vehicle operators should use extra caution when operating in adverse conditions such as rain, fog, snow, ice, strong winds, etc.
21. All vehicles operating on Taylor locations should be equipped with headlights, taillights, stop lights, mirrors, and horns. Forklifts are excluded from this requirement, but they do require headlights for night operations. It is recommended that forklifts be equipped with a horn, a mirror, and a back-up alarm.
22. When a fork lift is not in use, its parking brake should be engaged, and its forks should be fully lowered.
23. Forklifts should operate at slow speeds with load as low as possible while adequate ground clearance is maintained.

## **6. EMERGENCY DRILLS**

## **6. EMERGENCY DRILLS**

### **6.1 GENERAL**

Emergency drills comprise one of the best tools for ensuring that emergencies are dealt with in a timely and coordinated manner. Although the safety manuals and meetings are a fundamental part of the training process, actual simulated emergency situations will have a much greater impact. The most common deficiencies in a plan of this type have proven to be lack of training, equipment problems, organizational difficulties, and communication breakdowns. A great majority of these types of problems can be addressed and resolved with emergency drills training.

Drills should be carefully planned, realistically conducted, and thoroughly reviewed upon completion. The drill is not complete until it has been discussed among involved personnel and properly documented. Emergency drills can be productive only if the personnel are confident that they can react effectively in a real emergency. Not only should the drill teach personnel to respond, it should test their ability to do so.

Emergency drills will be planned by the Rig Site Supervisor and the Contractor Tool Pusher or Rig Manager, except in cases when higher management initiates the drill to test the Rig Site Supervisor and/or Tool Pusher/Rig Manager. Drills should be conducted for all personnel on all tours and will normally be conducted by the Person-In-Charge (PIC). Nevertheless, it is advisable to occasionally have the drill conducted by the back-up PIC so that everyone is adequately trained for that situation. Drill topics should be varied to realistically reproduce all reasonable scenarios, and drill frequencies, times, and days should be varied. Advance notification of the time and specifics of the drill should be given only to the personnel who will be directly involved in conducting the drill.

## 6.2 FIRE / EXPLOSION

1. Fire/explosion drill subjects, locations, times, and frequencies should be varied for maximum effectiveness. Occasionally, drills should be conducted at night. Drills will periodically include rescue operations and simulated injuries.
2. Suggested types of fires and/or explosions to be simulated include the following:
  - a. Flammable liquid
  - b. Combustible gas
  - c. Electrical
  - d. Trash / debris
  - e. Grass
  - f. Wood
3. When the alarm is sounded, all personnel, including the PIC, should report immediately to their pre-assigned assembly or muster location.
4. All equipment normally used during a fire and/or explosion should be tested during the drill. This equipment includes:
  - a. Fire extinguishers
  - b. Fire hoses
  - c. Fire pumps
  - d. Communications equipment
  - e. Standby vessel(s)

5. The drill should consist of the enactment of an emergency situation as realistically as possible, and it should include all associated operations, as follows:
  - a. Alarm
  - b. Muster or assembly
  - c. Roll call or head count
  - d. Fire-fighting response
  - e. Evacuation / rescue
  - f. Communications / notifications
  - g. Fire watch
  - h. Clean-up / de-watering
  - i. Documentation
  
6. The emergency drill should be discussed at its conclusion, and a record of the drill should be included in the Daily Drilling Report.

### **6.3 BLOWOUTS AND KICKS**

1. B.O.P. drills should be conducted for each tour at least once a week and should be enacted in accordance with U.S. Minerals Management Service (MMS) Requirements.
2. Drills should simulate well kicks and blowout prevention operations as realistically as possible.
3. B.O.P. drills should be scheduled and conducted in such a way that normal drilling operations are not endangered or altered.
4. B.O.P. drills should be discussed with the crew at their conclusion, and a record of the drill should be included in the Daily Drilling Report.

## 6.4 TOXIC GAS RELEASE

1. Toxic gas release drills should be conducted for rigs operating at locations where the potential for such a release exists.
2. Toxic gases that may be encountered during drilling or workover operations include:
  - a. Hydrogen sulfide (H<sub>2</sub>S)
  - b. Sulfur dioxide (SO<sub>2</sub>)
  - c. Carbon dioxide (CO<sub>2</sub>)
3. Emergency toxic gas release drills should simulate actual conditions as much as practicable and should occasionally include rescue operations and resuscitation procedures.
4. When the alarm is sounded, personnel should put on breathing equipment and assemble or muster at their pre-assigned locations.
5. Personnel should perform short periods of routine work assignments while wearing and using breathing equipment.
6. All breathing cylinders should be refilled immediately after use during a drill.
7. Toxic gas release drills should be discussed at their conclusion, and a record of each drill should be included in the Daily Drilling Report.

## 6.5 EVACUATION

1. Evacuation drills should be conducted regularly, both on land and offshore rigs.
2. When the alarm is sounded, all personnel, including the Person-In-Charge, should report immediately to their pre-assigned assembly or muster locations. Only the personnel required for continuing rig operations are excused.
3. All rigs should have a posted Rig Evacuation Plan in effect, and the drill should be conducted in accordance with this plan and as realistically as possible.
4. Personnel should take appropriate survival gear and clothing with them to drill.
5. Offshore personnel should enter the lifeboat during drills, and the boat commander should start and test the boat engine(s).
6. Evacuation drills should be discussed at their conclusion, and a record of each drill should be included in the Daily Drilling Report.

## 6.6 FIRST AID / MEDICAL RESPONSE

1. Drills should be conducted regularly for first aid treatment and medical response.
2. A volunteer or a first aid dummy should be used during the drill to simulate actual conditions.
3. Various types of injuries or ailments should be simulated during the drills for realism and full-range training. Suggested subjects include:
  - a. Broken bones
  - b. Hypothermia
  - c. Heat stroke
  - d. Shock
  - e. Electrocutation
  - f. Heart attack
  - g. Snake bite
  - h. Lacerations
  - i. Concussion
4. First aid supplies expended during drills (bandages, gauze, splints, etc.) should be replaced as soon as possible.
5. Drills should occasionally include emergency medical evacuations.
6. First aid/medical response drills should be discussed at their conclusion, and a report of each drill should be included in the Daily Drilling Report.

## 6.7 OIL SPILLS AND POLLUTION

1. Oil discharge drills should be conducted regularly and should realistically simulate an oil spill event and associated response procedures.
2. The drill should accurately reflect emergency response as specified in the Oil Spill Contingency Plan.
3. Various scenarios should be utilized to cover different types and magnitude of spills. Examples include:
  - a. Breach of secondary containment
  - b. Rupture of bulk fuel tank
  - c. Damaged tanker loading valve
  - d. Spilled lube oil drum
  - e. Separator upset
4. Oil spill and pollution drills should be discussed at their conclusion, and a report of each drill should be included on the Daily Drilling Report.

## **7. FIRST AID**

## **7. FIRST AID**

### **REFERENCE INDEX**

- 7.1 Basic First Aid Facts 7-2
  - 7.1.1 General 7-2
  - 7.1.2 Basic First Aid Objectives 7-2
  - 7.1.3 Overall Guidelines 7-3
- 7.2 First Aid Guidelines 7-5
  - 7.2.1 Loss of Breathing and Circulation (CPR Procedures) 7-5
  - 7.2.2 Heart Attack 7-7
  - 7.2.3 Bleeding 7-7
  - 7.2.4 Shock 7-9
  - 7.2.5 Choking 7-10
  - 7.2.6 Burns 7-11
  - 7.2.7 Electric Shock 7-13
  - 7.2.8 Inhalation of Toxic Gas or Smoke 7-13
  - 7.2.9 Exposure to Hydrocarbons (Liquids and Gases) 7-13
  - 7.2.10 Poisons 7-14
  - 7.2.11 Heat Exhaustion 7-14
  - 7.2.12 Heat Stroke 7-15
  - 7.2.13 Hypothermia 7-16
  - 7.2.14 Immersion Foot (Trench Foot) 7-18
  - 7.2.15 Insect Stings 7-18
  - 7.2.16 Venomous Snake Bites 7-19
  - 7.2.17 Spider Bites 7-20

## 7.1 BASIC FIRST AID FACTS

### 7.1.1 GENERAL

The American Red Cross defines first aid as the “immediate and temporary care given the victim of an accident or sudden illness until the services of a physician can be obtained.” Effective first aid consists primarily of common sense and a few simple rules.

The intent of this section is to present the basic first aid guidelines that must be administered to a victim of an accident or sudden illness until a qualified physician or paramedic can be obtained. These guidelines are not intended to replace advanced first aid or medical training, but if they are followed, the possibility of death or severe damage to the injured person will be dramatically reduced.

The following conditions require that basic life support procedures be used immediately:

- A. Loss of breathing or circulation can cause death or brain damage in four to six minutes.
- B. Severe bleeding can cause death in one to two minutes.
- C. Poisoning can cause serious injury or death in seconds, depending on the particular type of poison. Every second counts in preventing further damage.

### 7.1.2 BASIC FIRST AID OBJECTIVES

- A. The primary objective in first aid is to sustain life by utilizing basic life support techniques to:
  - 1. Maintain an airway.
  - 2. Maintain breathing.
  - 3. Maintain circulation.
  - 4. Control bleeding.
  - 5. Treat for shock.
  - 6. Get medical care for the victim.
- B. The first aid provider must avoid panic, offer reassurance, inspire confidence, and do no more than necessary until medical help arrives.

- C. If there is no dispensary, clinic, or hospital in the near proximity of the worksite to treat employees, one or more employees must be adequately trained to render first aid. Only approved First Aid Kits will be kept on site.

NOTE: For employees that may be sensitive to insect bites and/or stings, benadryl should be included as the only oral medication necessary for the first aid kit. Individuals who are hypersensitive to insect stings should carry their own personal physician prescribed kit at all times.

- D. Oxygen equipment should be kept at field sites for use in the event of heart attack or exposure to noxious fumes. It should be of the type that delivers oxygen on demand.

The pressure-demand resuscitator should only be used when the site is extremely remote and individuals are present who have received advanced first aid training and know how to properly use resuscitators. A resuscitator in the hands of an untrained person can further complicate the victim's condition.

### 7.1.3 OVERALL GUIDELINES

Know the location of the first aid station, life support equipment, emergency showers and eye wash fountains.

Know the emergency phone numbers for reporting accidents and obtaining ambulances, helicopters and boats.

Become familiar with the toxic and poison chemicals and gases that are commonly used. (See appropriate sections in this manual.) Pay particular attention to the information on hydrogen sulfide (H<sub>2</sub>S) and sulfur dioxide (SO<sub>2</sub>).

Inform the supervisor and co-workers if you are sensitive to certain medication such as penicillin, allergic or hypersensitive to insect bites, diabetic, or if you require medication for ailments such as high blood pressure, hypertension, etc.

Clothing contaminated with any chemical or petroleum product should be removed.

Do not attempt to remove foreign material from another person's eye.

If acid, caustic, toxic or another injurious substance is splashed on the skin or clothing, immediately wash it off with water. Use the emergency shower if required and remove contaminated clothing at once. In some cases, special neutralizing agents are available and should be used as prescribed.

Eyewash fountains should be used if acid, caustic, toxic or other injurious substances are splashed into the eyes. If eyewash fountains are not readily accessible, wash with a gentle stream of potable water. Do not use high pressure water.

When providing first aid to an injured person, do not panic; offer reassurance, inspire confidence, and speak in a soft, gentle voice.

If there is no dispensary, clinic or hospital at or near the work site, at least two personnel per shift must be adequately trained to render first aid.

## 7.2 FIRST AID GUIDELINES

### 7.2.1 LOSS OF BREATHING AND CIRCULATION

A person whose breathing and circulation have stopped will die or suffer brain damage if these functions are not restored in four to six minutes. The initial evaluation of a victim should follow the procedures developed by the American Red Cross for basic life support, called the "ABC evaluation."

- A. Airway - After assuring yourself that the victim is unconscious, open the airway by tilting the head back. Look into the mouth and remove anything that is blocking or could potentially block the airway. This includes gum, partial plates, and chewing tobacco.
- B. Breathing - Determine whether the victim has stopped breathing or not. Do this by placing the cheek next to the victim's nose and mouth to feel an exchange of air. At the same time, watch for any chest movement.
- C. Circulation - Initially place the tips of two fingers on the larynx (voice box) and slide them gently into the groove between the voice box and the muscle of the neck. This is the location of the carotid artery where you can feel if the heart is circulating blood.

If breathing has ceased, begin mouth-to-mouth or mouth-to-nose resuscitation. If circulation has stopped, begin external cardiac massage. When combined, these procedures are known as cardiopulmonary resuscitation (CPR).

To be performed effectively, the procedures *must* be learned in a certified course. Although the procedures will be briefly discussed in this section, the discussion is not intended to replace an official course.

## CPR

The following CPR procedure should be performed by a single rescuer after evaluation indicates that breathing and circulation have stopped.

- A. Deliver four quick breaths using mouth-to-mouth or mouth-to-nose breathing. Do this in such a way that the victim does not have a chance to completely exhale.
- B. Place the heel of one hand over the lower half of the sternum (breastbone) and place the other hand on top of the first hand. Keeping the arms straight, deliver a quick, downward, piston-like thrust to compress the victim's chest 1½ to 2 inches. This procedure compresses the heart between the sternum (breastbone) and the backbone, forcing it to circulate blood. Deliver this thrust 15 times at a rate of approximately 80 times per minute.
- C. After 15 compressions, immediately tilt the victim's head back and deliver two quick breaths mouth-to-mouth.
- D. Repeat the cycle of delivering 15 compressions and two breaths until medical help arrives.
- E. Once a minute, check the carotid artery for a pulse. Do this between compressions and the two breaths.
- F. If you feel a pulse, deliver one breath every five seconds while ensuring that circulation is still present. If breathing and circulation return, keep a close watch over the victim in case these processes stop again.

The following CPR procedure is used if a situation involves two rescuers:

- A. One person does the ABC evaluation while the other rescuer prepares to deliver external cardiac massage.
- B. The rescuer who has done the evaluation and found no breathing or circulation delivers four quick breaths by mouth-to-mouth resuscitation.
- C. When the four breaths are completed, the other rescuer starts delivering compressions at the rate of 60 times per minute.
- D. After every fifth compression, the first rescuer delivers one breath mouth-to-mouth. The ratio then becomes five compressions to one breath until help arrives or a pulse is restored.

*Never* practice CPR procedures on real people. These are violent maneuvers that can injure a person if improperly executed. These procedures are learned in a formal CPR course in which life-size mannequins are used for practice.

Conditions that can cause breathing and/or circulation to stop include: electric shock, inhalation of gas such as H<sub>2</sub>S, inhalation of smoke, lack of oxygen, heart attack, drowning, or a hard blow to the chest.

### 7.2.2 HEART ATTACK

For heart attack victims, use the following procedure:

- A. Perform an ABC evaluation as defined above. Begin CPR if breathing and circulation have ceased. Continue CPR until the vital signs have been restored.
- B. If breathing and circulation are present, keep calm and reassure the victim.
- C. Loosen the clothing and help the victim get into a comfortable position (usually halfway between lying and sitting). *Do not* carry or lift the victim more than necessary. Have someone call for medical help.
- D. *Do not* give the victim any liquids without a doctor's advice.

### 7.2.3 BLEEDING

Severe bleeding results from wounds to large blood vessels. Bleeding *must* be controlled quickly. Don't waste time—apply direct pressure over the wound. The following procedure should be used in the event of severe bleeding:

- A. Place a clean pad, handkerchief, or cloth over the wound and press firmly with the hands. If you do not have a pad or bandage, close the wound with the hand or fingers.
- B. Apply pressure directly over the wound.
- C. Hold the pad firmly in place with a bandage, necktie, cloth strip, etc.
- D. Raise the bleeding part higher than the rest of the body unless bones have been broken.

- E. Keep the victim lying down.
- F. Keep the victim warm. Cover the victim with blankets or coats, and put something under the victim when the victim is found lying on a cold or damp surface.
- G. If the victim is conscious and can swallow, and if abdominal injury is not suspected, give plenty of liquids (such as water, tea, or coffee).
- H. Get medical help.

A tourniquet should be used only to treat severe, life-threatening bleeding that cannot be controlled by other means (usually an amputated, mangled, or crushed arm or leg, or bleeding of several arteries). The procedure for applying a tourniquet is as follows:

- A. Use only a strong, wide piece of cloth. *Never* use wire, rope, twine, or other narrow materials.
- B. Place the tourniquet immediately above the wound, between the body and the edge of the wound. Some normal skin should be left between the tourniquet and the wound. If the wound is near a joint, place the tourniquet at the closest practical point above the joint.
- C. Make sure the tourniquet is just tight enough to stop the bleeding. If possible, attach a card to the victim showing the time and place the tourniquet was applied.
- D. Once the tourniquet has been applied, the victim should be taken to a medical facility immediately. The tourniquet should be removed only by a physician or medical personnel who are prepared to control bleeding.
- E. One to two hours is the maximum time that a tourniquet can be left in place without causing further damage.

## 7.2.4 SHOCK

Whenever someone suffers from trauma or emotional upset, shock may be present. Shock *must* be considered as a possible complication of every injury and severe illness. Shock occurs when the circulation to vital organs of the body (especially the brain) slows down. This condition is severe and can be life threatening if it is not corrected. The symptoms of shock include the following:

- A. Cold, clammy skin
- B. Shallow breathing
- C. Rapid pulse
- D. The victim feels cold and may even be shaking.
- E. Weakness
- F. Confusion or disorientation

Shock should be treated as follows:

- A. Have the victim lie down.
- B. Keep the airway open. If the victim vomits, turn the head to the side so the neck is arched with the chin pointing down.
- C. If the victim complains of being cold, use a blanket or coat for a cover.
- D. Increase circulation to the brain by elevating the victim's legs so that the head is lower than the body.
- E. Reassure the victim.
- F. If the victim is conscious and can swallow, administer fluids (water, tea, soft drinks, etc.).
- G. *Never* give the victim alcoholic beverages.
- H. *Do not* give the victim fluids if you think the abdomen may be injured.

## 7.2.5 CHOKING

If the victim cannot speak, cough, or breathe, take the following action until medical help arrives:

### A. For a conscious victim:

1. Stand just behind and to the side of the victim, who can be standing or sitting. Support the victim with one hand on the chest. The victim's head should be lowered. Deliver four sharp blows between the shoulder blades. If this technique does not lessen choking, go to step 2:
2. Stand behind the victim, who can be standing or sitting. Wrap the arms around the victim's middle, just above the navel. Clasp the hands together in a doubled fist and press in and up in quick thrusts. Repeat this maneuver several times. If choking continues, repeat a cycle of four back blows and four quick thrusts until the victim is no longer choking or becomes unconscious.

### B. For an unconscious victim:

1. Place the victim on the ground and deliver rescue breathing. If the victim does not start breathing and if it appears that the air is not going into the victim's lungs, go to step 2:
2. Roll the victim onto one side, facing you, with the chest against the knee. Then, deliver four sharp blows between the shoulder blades. If the victim still does not start breathing, go to step 3:
3. Roll the victim face-up and deliver one or more manual thrusts. To deliver the thrusts, place one hand on top of the other, with the heel of the bottom hand in the middle of the abdomen, slightly above the navel and below the rib cage. Press into the victim's abdomen with a quick upward thrust. Do not press to either side. Repeat this action four times if the victim does not start breathing. Even if breathing begins, go to step 4:

4. Clear the airway.
  - a. Hold the victim's mouth open with one hand, using the thumb to depress the tongue.
  - b. Make a hook with the middle finger of the other hand, and, in a gentle sweeping motion, reach into the victim's throat and feel for a foreign object that may be blocking the air passage. Repeat the following procedure until the air passage is clear; administer four back blows, four abdominal thrusts, probe in the mouth, and try to inflate the lungs.
5. If the object has not been retrieved, but the victim suddenly seems all right, take the victim to the hospital anyway. This action is particularly important if the swallowed object is a fish bone, chicken bone, or another jagged object that could cause internal damage if it passes through the victim's digestive system.

#### 7.2.6 BURNS

Burns can occur from heat sources (thermal), chemicals, and low temperature liquids. Extensive burns are very painful, and the victim often goes into shock or becomes dehydrated. Large burns are also easily contaminated and infected.

##### A. HEAT BURNS

Use the following procedures for victims of heat burns:

1. For small burns, if the skin is not broken, immerse the skin in clean, cool water or apply ice to relieve the pain. If the skin is broken, place a sterile gauze or clean cloth soaked with cool water or ice over the burn.
2. ***Do not*** break blisters.
3. For large or extensive burns: place a clean cloth over all burned areas to prevent exposure to air. Wet the burn with cool water. The victim should lie down with the head and chest lower than the remainder of the body. Raise the feet, if possible.

## B. CHEMICAL BURNS (OF THE SKIN)

Use the following procedures for victims of chemical burns:

1. Immediately flush the burn with water. Speed in applying diluent (water) helps reduce the extent of the injury.
2. Apply a stream of water to the burn while removing the victim's clothes.
3. Place the cleanest available material over the burned area.
4. If the burn area is extensive, make the victim lie down. Place the head and chest a little lower than the rest of the body, and raise the legs if possible. Extensive burns should be examined by a doctor. Seek medical attention promptly.

## C. CHEMICAL BURNS (OF THE EYES)

Check the victim's eyes for contact lenses and remove them if they are present. Wash the eyes by plunging the head into a vessel of clean water and having the victim blink rapidly, or by allowing water from a drinking fountain or hose to flow into and flush the eyes. If neither of these procedures can be done immediately, pour clean water into the victim's eyes from a drinking cup. It is a good practice to keep an eyewash bottle filled with clean water available for emergency use. If the victim's eyelids will not remain open, get another person to hold the lids open, and wash the eyes for 15 minutes. Use only water to wash chemical burns. Never use another chemical to flush the burns, because this procedure can increase the extent of the injury.

## D. COLD BURNS

Cold burns can result when liquefied petroleum gas (LPG), carbon dioxide (CO<sub>2</sub>), or Nitrogen (N<sub>2</sub>) is released to atmosphere from pressurized containers and if dry ice (solid CO<sub>2</sub>) contacts the skin. Cryogenic liquids such as helium and natural gas (LNG) can cause extreme injury but are not commonly seen at the work site. Injuries from LPG, N<sub>2</sub>, or CO<sub>2</sub> are caused by freezing the skin or tissue and should be treated as follows:

1. Simple burns on the skin should be treated by flushing with water. Extensive burns should be examined by a doctor.
2. Eye burns can be very destructive. If LPG, low-temperature CO<sub>2</sub>, or N<sub>2</sub> contacts the eyes, flush the eyes with water and seek immediate medical attention.

### 7.2.7 ELECTRIC SHOCK

For a victim of electric shock, perform the following procedure:

- A. Throw the switch to turn off the current, or use a dry board or stick to remove the electric contact from the victim.
- B. Do the ABC evaluation as defined in Section 30 and begin CPR if breathing and/or circulation have ceased.
- C. If breathing and circulation are present, remain with the victim until medical help arrives. It is important that an individual who has suffered an electric shock be evaluated by a physician, since electric shock can severely injure many parts of the body.

### 7.2.8 INHALATION OF TOXIC GAS OR SMOKE

- A. The victim should be removed from the contaminated area immediately. Nevertheless, do not attempt to rescue the victim by yourself if help can be found quickly. Do not enter the contaminated area without respiratory equipment.
- B. Keep the victim lying down until medical help arrives.
- C. If breathing and/or circulation has stopped, perform CPR.

Hydrogen sulfide ( $H_2S$ ) and sulfur dioxide ( $SO_2$ ) are often encountered at producing sites. These two gases are extremely dangerous if inhaled. It is imperative that each person familiarize himself with the physical properties and the methods of detection, protection and treatment from inhalation.

### 7.2.9 EXPOSURE TO HYDROCARBONS (LIQUIDS AND GASES)

- A. An individual overcome by vapors must be removed from exposure immediately. A physician should be called. If breathing is irregular or stopped, administer artificial respiration.
- B. If a liquid petroleum product is swallowed, do not induce vomiting. Call a physician promptly.

- C. For skin contact, remove contaminated clothing and wash the skin with soap and water. If the petroleum liquids splash into eyes, wash the eyes with clear water for 15 minutes or until irritation subsides.

#### 7.2.10 POISONS

If poisons are swallowed, professional advice should be obtained as soon as possible. Identify the poison and follow the doctor's advice. If a doctor or poison control center cannot immediately be reached by phone or radio, the following guidelines apply in most cases:

- A. Try to identify the substance ingested.
- B. Induce vomiting by putting a finger down the victim's throat, unless the substance swallowed is a hydrocarbon. In that case, do not induce vomiting, since that action may aggravate the condition.
- C. Call a physician, emergency room, or poison control center for advice. If you cannot identify the poison, have the victim drink milk or a solution of milk and raw eggs to coagulate the material. Try again to induce vomiting by forcing the victim to gag.

#### 7.2.11 HEAT EXHAUSTION

The symptoms of heat exhaustion include the following:

- A. Pale, cold, clammy skin
- B. Rapid, weak pulse
- C. Weakness, headache, or nausea
- D. Cramps in abdomen or limbs
- E. Excessive perspiration

Heat exhaustion should be treated as follows:

- A. Move the victim to a cool place in the shade.
- B. Make the victim lie down so the head is lower than the rest of the body.

- C. Give the victim water to drink and, if available, stir one-quarter teaspoon of salt into the water.
- D. Get medical help.

#### 7.2.12 HEAT STROKE

Heat stroke is life threatening, and immediate measures **must** be taken to cool down the victim and get medical care. The symptoms of heat stroke include the following:

- A. Flushed, dry, hot skin
- B. Rapid, strong pulse
- C. Temperature well above normal and skin hot to the touch.
- D. Headache, dizziness, nausea
- E. Unconsciousness

Heat stroke should be treated as follows:

- A. Move the victim to a cool place.
- B. Treat the victim for shock (see #7.2.4 above).
- C. Cover the entire body with cold water, using either a sponge or a hose. Cover the victim with ice, if available.
- D. If the victim is fully conscious and can swallow, administer water, or, if available, one quarter teaspoon of salt in a glass of water.
- E. **Do not** offer alcoholic beverages.
- F. Obtain medical help immediately.

### 7.2.13 HYPOTHERMIA

Hypothermia is a body temperature reduction caused by the insufficient generation of heat. Hypothermia may occur at temperatures both above and below freezing, and it is especially common in wet environments. Wind combined with cold weather makes the body temperature drop faster than calm, cold weather does. Wind chill increases the risk of hypothermia. If hypothermia is not recognized and treated quickly, it may result in death.

The following precautions help prevent hypothermia:

- A. Before going outside, rest and eat properly.
- B. Continue food intake once outside.
- C. Make sure clothing and outer wear are windproof and waterproof.
- D. Carry emergency survival equipment.
- E. Before beginning an outdoor task, think about what must be done to remain at the location overnight. Make sure a shelter is available to carry out that encampment.
- F. When working in a cold environment, reduce sweating by removing clothing layers and then putting them back on when resting.
- G. Exercise (isometric) to help the body produce heat.

The symptoms of hypothermia include the following:

- A. The signs observed by others are poor coordination, slowness, stumbling, thickness of speech, amnesia, irrationality, poor judgment, hallucinations, bluish or puffy skin, dilated pupils, decreased heart and respiratory rates, weak or irregular pulse, and stupor.
- B. The symptoms noticed by the victim include intense shivering, muscle tenseness, fatigue, numbness or coldness, poor coordination, stumbling, poor articulation, disorientation, a decrease in shivering followed by muscles going rigid, bluish or puffy skin, and a slow, irregular, or weak pulse.

Hypothermia should be treated as follows:

- A. Reduce heat loss by sheltering the victim from wind and weather.
- B. Isolate the victim from the ground. Replace wet clothing with windproof, waterproof clothing, and have the victim increase his or her exercise level if possible.
- C. Administer heat by giving the victim hot drinks. **Do not** give the victim alcoholic beverages.
- D. Place the victim in a sleeping bag with another person.
- E. Make the victim huddle with others for body heat. If you are in a permanent location, immerse the victim in water heated to 100-108 °F.

#### IMMERSION HYPOTHERMIA

Immersion in near-freezing water for only a few minutes while inadequately dressed causes rapid and total body cooling. If remedial action is not taken, death may result.

The following precautions help prevent immersion hypothermia:

- A. Wear an insulated life vest, or, preferably, a float coat. This device **must** be zipped and hooked properly in order to insulate and maintain flotation.
- B. Stay alert and out of the water.
- C. If accidentally immersed in cold water, move as little as possible. The head should be kept out of the water, the legs drawn up to the chest, and arms crossed over the chest. This position conserves body heat and improves the chance of survival.

The symptoms of immersion hypothermia are identical to those of hypothermia. Victims of immersion hypothermia should be treated gently and warmed immediately.

- A. Gently remove wet clothing and place the victim in a warm sleeping bag. If the victim is very cold, it may be necessary for one or two other people to remove their clothing and climb into the bag, using body heat to rewarm the victim.

- B. **Do not** allow the victim to exercise or move, because activity increases the flow of cold blood from the extremities to the heart.
- C. Warm liquids are appropriate only for immersion victims with body temperatures above 90°F.

#### 7.2.14 IMMERSION FOOT (TRENCH FOOT)

Immersion foot affects only the feet. It results from wearing boots and socks that are very cold and wet for prolonged periods of time.

- A. To prevent immersion foot, replace wet socks with dry socks and rewarm the feet every six or eight hours.
- B. The symptoms of immersion foot are similar to those of frostbite: a sense of cold to numbness to false warmth, dead skin turning white, and impaired motion of the toes.
- C. To treat immersion foot, dry and rewarm the feet by wrapping with blankets. The affected areas should never be rubbed. Lukewarm water may be used, but never use hot water, heat lamps, or flame to warm the affected areas.

#### 7.2.15 INSECT STINGS

- A. A person who is stung by a wasp, bee, yellow jacket, ant, fire ant, or other stinging insect will suffer pain and mild swelling.
- B. To treat insect stings, the stinger should be removed. This procedure can be done easily with tweezers, and ice should be applied to the area through the gentle rubbing of an ice cube on the bite sites. Normally, nothing more needs to be done.
- C. Some people are hypersensitive to insect stings. These people react to stings with great swelling, or they develop hives beyond the area of the sting. Some hypersensitive people have difficulty breathing or collapse entirely. Usually, these people are aware that they are reacting more severely to each new bite. A hypersensitive person should obtain a kit to carry at all times, to be used in the event of a sting. Associates and the person's supervisor should be told that the person is hypersensitive to insect stings.

## 7.2.16 VENOMOUS SNAKE BITES

The common venomous snakes are the rattlesnake, the copperhead, the cottonmouth and the coral snake. Basic first aid for snake bites should be administered as follows:

- A. Keep the bite at the level of the heart. Elevation will hasten spread of venom.
- B. **Do not** give the victim alcoholic beverages.
- C. Victims should not run, since this action will speed up circulation and increase the spread of venom.
- D. Keep the victim warm, but do not apply heat to the wound.
- E. Keep the victim calm and quiet.
- F. Transfer the victim to a medical facility as soon as possible.
- G. **Do not** apply ice or a cold pack to the bite.
- H. Notify the exact location to the supervisor, medical officer or someone else if a radio or telephone is available.
- I. If possible, identify the snake and kill it.
- J. If it takes more than one hour to reach a medical facility:
  - 1. Place a constricting band (not a tourniquet) two or three inches above the bite. This band is not intended to constrict the flow of blood, and you should be able to insert at least one finger between the band and the skin.
  - 2. Make two incisions, one through each fang mark, with a sharp knife, a razor blade, or a blade from a snakebite kit (**do not** make an "X"). The incisions should be 1/4-inch long and 1/8-inch deep, just deep enough for blood to start oozing.
  - 3. Apply suction to the wound using the rubber suction cup from the snakebite kit. If nothing else is available, use mouth suction. (**Do not** use mouth suction if you have open sores in the mouth.)

K. Coral snakes inject the venom by chewing the flesh. As a result, suction and a constricting band are ineffective for extracting venom. Treat a coral snake bite as follows:

1. Wash the bite with clean water.
2. Transfer the victim to a medical facility as soon as possible.

#### 7.2.17 SPIDER BITES

There are many species of spiders which produce venom, but only a few are capable of penetrating the skin. The black widow and brown recluse (fiddle back) spider are two species that can penetrate the skin and whose venom may be as poisonous as venom from snakes. Typical symptoms for spider bites and venomous snake bites are:

- A. Swelling and pain at the bite site
- B. Headache
- C. Nausea and/or vomiting
- D. Joint pain and muscle cramps

Treat a spider bite as follows:

- A. Have the victim lie down.
- B. **Do not** use constrictive bands or suction cups. This method is not effective for spider bites.
- C. Take the victim to a medical facility as soon as possible.
- D. If pain is severe, an ice cube can be massaged on the bite site. This action will help relieve the pain. **Do not** apply ice or cold packs to the wound for a prolonged period of time.
- E. **Do not** allow the victim to walk.
- F. **Do not** give the victim alcoholic beverages.

The black widow spider is usually found in dark, moist places. It is usually jet black in color and has a red, hour-glass mark on its abdomen. The bite of this spider immediately causes severe pain at the bite site.

The brown recluse spider (fiddle back) is normally found in sheds, houses, closets, and under leaves. It has a violin-shaped mark on its back. The bite of this spider causes little or no immediate pain. Many times, the victim is not aware of the insect bite until several hours have passed and a crusted wound surrounded by a black bulls-eye appears at the bite site. This wound is an indication that tissue damage caused by the venom has occurred. This damage can cause tremendous disability to the victim because the venom literally destroys all the tissue it encounters.

## **8. INDUSTRY STANDARDS AND REFERENCES**

## 8. INDUSTRY STANDARDS AND REFERENCES

The publications listed below contain information related to the practices presented in this Safe Drilling and Workover Practices Manual. The most recent editions of the following publications may be consulted for additional information.

### **American Petroleum Institute (API) Publications and Recommended Practices:**

Publ 2009	“Safe Welding and Cutting Practices”
Publ 2214	“Spark Ignition Properties of Hand Tools”
Publ 2217	“Guidelines for Confined Space Work”
Publ 2219	“Safe Operation of Vacuum Trucks in Petroleum Services
RP 7C-11F	“Installation, Maintenance, and Operation of Internal Combustion Engines”
RP 8B	“Hoisting Tool Inspection and Maintenance Procedures”
RP 49	“Safe Drilling of Wells Containing Hydrogen Sulfide”
RP 53	“Blowout Prevention Equipment Systems for Drilling Wells”
RP 54	“Occupational Safety for Oil and Gas Well Drilling and Servicing Operations”
RP 57	“Offshore Well Completion, Servicing, Workover, and Plug and Abandonment Operations”
RP 59	“Well Control Operations”
RP 62	“Evaluation of Mobile Offshore Drilling Unit Emergency Power Systems and Fire Protection Systems”
RP 500	“Classification of Locations for Electrical Installations at Petroleum Facilities”
RP T-1	“Orientation Programs for Personnel Going Offshore for the First Time”

RP T-4 "Training and Qualification of Offshore Personnel in Non-Operating Emergencies"

RP T-6 "Training of Personnel in Well Control Equipment and Techniques for Completion and Workover Operations"

RP T-7 "Training of Personnel in Rescue of Persons in Water"

**International Association of Drilling Contractors (IADC) Publications:**

"Accident Prevention Reference Guide"

**Association of Oil Well Servicing Contractors (AOSC) Publications:**

"Recommended Safe Procedures and Guidelines for Oil and Gas Well Servicing"