

## DEPARTMENT OF LABOR

## Occupational Safety and Health Administration

## 29 CFR Part 1910

[Docket No. S-360]

## Oil and Gas Well Drilling and Servicing

AGENCY: Occupational Safety and Health Administration (OSHA).

ACTION: Proposed rulemaking.

**SUMMARY:** OSHA proposes to issue employee safety requirements for drilling, servicing and special services operations for oil and gas wells. This standard would supplement existing standards in 29 CFR Part 1910 and would address the unique hazards found in these operations. OSHA expects that this standard will result in a decrease in the number of deaths and injuries occurring in this industry. Also, this standard, along with the non-mandatory appendices, will provide employers and workers with a set of mandatory rules and voluntary guidelines on which to base company safety programming efforts.

**DATES:** Comments on the proposed standard must be postmarked by March 5, 1984.

Requests for a hearing must also be postmarked by March 5, 1984.

**ADDRESS:** Comments, information, and hearing requests should be sent to: Docket Officer, Docket No. S-360, Occupational Safety and Health Administration, Room S6212, U.S. Department of Labor, Washington, D.C. 20210.

**FOR FURTHER INFORMATION CONTACT:** Mr. James F. Foster, Occupational Safety and Health Administration, Room N3637, U.S. Department of Labor, Washington, D.C. 20210, (202) 523-8151.

**SUPPLEMENTARY INFORMATION:****I. Background**

The drilling and servicing industry is involved in locating and extracting underground deposits of oil and gas and in maintaining the equipment used to bring the oil and gas to the surface. This industry has some safety problems which are unique, and some which are common to all workplaces. Unique hazards include those related to the cathead, rotary table, and well pressures. Hazards which are common to many industries including the oil and gas well drilling and servicing industry are falls from elevated platforms, slipping/tripping hazards and machine guarding hazards.

The oil and gas well drilling and servicing industry is ranked among the most hazardous industries in the United States according to data collected and published by the Bureau of Labor Statistics. In 1973 OSHA decided to regulate this industry under its Construction Safety Standards (29 CFR Part 1926). This decision was based on the proposition that the processes and equipment used and the hazards encountered were similar to those in the construction industry.

However, the application of the construction safety standards to the oil and gas well drilling and servicing industry was contested by the industry. As a result of this controversy, the Occupational Safety and Health Review Commission (OSHRC) issued several rulings holding that the construction standards were not applicable to oil and gas production (*MND Drilling Corporation*, No. 76-4149, 1977-1978 CCH OSHD ¶22,289 (ALJ 1977); *R. B. Montgomery Drilling, Inc., et. al.*, No. 76-2131, 1977-1978 CCH OSHD ¶21,755 (ALJ 1977); *Fairbanks Well Service, Inc.*, No. 76-4297, 1977-1978 CCH OSHD ¶21,740 (ALJ 1977); *Bomac Drilling*, No. 76-450, 1977-1978 CCH OSHD ¶21,667 (ALJ 1977); *B-J Hughes, Inc.*, 1982 CCH OSHD ¶25,977 (3/31/82), re: Construction standards not covering drilling; *Snyder Well Servicing, Inc.*, 1982 CCH OSHD ¶25,943 (2/2/82), re: not covering well swabbing). (See Reference 25.) According to the OSHRC, employers engaged in oil and gas well drilling and servicing should be subject to the general industry standards found in 29 CFR Part 1910.

OSHA subsequently began gathering information on the types and numbers of injuries and deaths occurring in this industry and attempting to determine whether the general industry standards (29 CFR Part 1910) were adequate to protect workers in this industry. It was determined, based on Bureau of Labor Statistics (BLS) data, that this industry has a number of special safety and health problems which are reflected by a higher than average injury and illness incidence rate (see Reference 26).

In addition, new enforcement problems emerged as a result of applying the general industry standards. It was apparent that the general industry standards either did not address or inadequately addressed a number of hazards unique to the oil and gas well drilling and servicing industry, possibly even contributing to this higher injury and illness incidence rate. Because of the uniqueness of these operations and the lack of specific standards to protect workers from serious hazards associated with these

operations, Section 5(a)(1) citations (general duty clause of the Occupational Safety and Health Act (OSH Act)) were issued whenever a specific standard was lacking (see Reference 6).

In 1980, the National Institute for Occupational Safety and Health (NIOSH) began a study of problems in this industry to provide recommendations for standards development. In addition, OSHA continued to gather information and data concerning the operations, machinery, equipment and hazards related to the industry (see Reference 8). Reviews were conducted of state standards (see References 9-16), standards of other government agencies (see References 19-20), industry practices (References 1-3) and standards of foreign governments (see References) to see how specific problems were addressed. Many of the proposed requirements were adopted from, or based on, state standards and industry recommendations when OSHA found that these standards appeared to adequately address the hazards found. (Examples include: (d)(3), (d)(6), (e)(1), and (e)(6)).

In January 1982, oil industry representatives, including members of the International Association of Drilling Contractors (IADC) and the Association of Oil Well Servicing Contractors (AOSC), met with OSHA. These industry representatives expressed an interest in providing assistance to OSHA to develop a meaningful standard that would protect the safety and health of workers performing drilling and servicing operations and reduce the adversarial relationships that existed in the past. The representatives stated their dislike for the widespread use of "general duty" citations and requested that the proposed standard clearly state what was necessary for compliance.

In the spring 1982, BLS began a Work Injury Report (WIR) study (Reference 7). At the same time OSHA initiated an analysis to determine the costs of the proposed standard. In addition OSHA analyzed all of the Agency's closed fatality case files related to oil and gas well drilling and servicing (Reference 5).

In June 1982, OSHA circulated a draft of the proposed rule and requested comments from its field staff, states, trade associations, labor unions, and other interested groups and parties. In July 1982, OSHA participated in a meeting in Dallas, Texas with representatives of industry, Government, and other interested parties. Additionally, OSHA held meetings with ad-hoc committees, trade association groups, state and Federal

field staff, and several individuals and groups who requested discussion of the proposed rule. The draft was modified to reflect the input OSHA received during this first round of review.

A second draft (dated November, 1982) was circulated for additional comment in December 1982. OSHA again received significant input from industry sources, interested states and the insurance industry.

In all, OSHA received written and oral input from over 100 external sources. These included the following: Association of Oilwell Servicing Contractors, American Petroleum Institute, individual drilling and servicing companies, the states of Oklahoma, Michigan, Alaska, California, Kentucky, and the United General Insurance Company. OSHA found this input helpful in developing this proposal.

OSHA believes that the current general industry standards inadequately address the unique hazards encountered during drilling, servicing and the performance of special services operations on oil and gas wells. OSHA believes this lack of adequate regulatory protection has contributed to the high number of deaths and injuries in this industry. Additionally, the frequent issuance of general duty citations by OSHA compliance officers is further evidence of the inadequacy of current regulations.

In OSHA's view, an industry-specific standard should be promulgated in order to provide adequate protection to workers in this industry. Therefore, this proposed standard covers those hazards which are unique to this industry and complements the general industry standards protecting the workers in this industry.

Many hazards found on oil and gas well drilling and servicing rigs are common to virtually all workplaces and these hazards are addressed by the OSHA General Industry Standards (29 CFR Part 1910) which will continue to apply. However, this industry has many unique hazards or special work circumstances which require special standards. Therefore, these industry-specific problems—the unique hazards—are addressed in the proposed rule.

The selection of the proposed requirements to be added to Part 1910 are based upon (1) the situations where the general duty clause (Section 5(a)(1) of the Act) has been invoked; for example, using the rotary table to breakout drill pipe (Reference 6); (2) the special situations dictated by the location of operations, for example, medical and first aid requirements and

emergency planning; (3) the unusual or specialized equipment, for example, catheads, drawworks, and rotary tables; and, (4) the specialized procedures in this industry, for example, cementing, drill stem testing, and wireline operations.

In common with most OSHA safety standards recently promulgated or under development, a level of performance rather than adherence to a specification is emphasized. OSHA believes this approach allows sufficient latitude for the employer to control the hazards effectively. In many cases, however, some employers may not have the expertise or the time available to develop specific compliance measures that will meet the performance-oriented standard. For assistance to these employers, some examples of "how to meet the standard" are included in the Appendices. These examples are not mandatory, but only provide guidance. Other sources may also be consulted, such as trade associations, professional safety publications, and states with on-site consultation services.

## II. Agency Action

OSHA has determined that there now exists a sufficient body of data and information upon which a reasonable standard can be based to effectively reduce the number of injuries and deaths associated with oil and gas well drilling, servicing and special services operations. The standard being proposed by OSHA reflects this determination.

Workers in the oil and gas well drilling and servicing industry are exposed to a number of hazards associated with both the equipment and the various operations performed during the course of drilling or servicing. There are approximately 5,400 rigs in operation where workers are exposed to these hazards and it is estimated that there are approximately 95,000 workers employed in various occupations relating to oil and gas well drilling and servicing. The death and injury experience which is described in References 4, 5, 6, 7, 8, 17, and 18 is compelling evidence that OSHA needs to take action to reduce the occurrence of these deaths and injuries. These reports clearly show that there is a significant risk to workers in this industry, and that mandatory standards are necessary. This proposal is the Agency's response to this need for mandatory standards.

Data indicate that workers in this industry have been exposed to hazards for many years which OSHA has inadequately regulated through existing standards. OSHA data show that the oil

and gas industry receives the highest percentage of 5(a)(1) citations compared to other industries. These citations, which are issued only when a standard does not exist to address the hazard but yet the hazard is well recognized as a potential source of serious injury, have indicated clearly that there is a lack of standards directed to these hazards. OSHA can be and must be more specific in its requirements in order to assist employers in meeting their obligations under the Occupational Safety and Health Act.

OSHA has completed three studies covering accidents in the oil and gas well drilling and servicing industry. These studies show that workers in this industry are exposed to significant risks of injury and death on the job.

The first study (Reference 4) was completed in 1980 and is entitled, "Selected Occupational Fatalities Related to Oil/Gas Well Drilling Rigs as Found in Reports of OSHA Fatality/Catastrophe Investigations." This was a study of 30 selected fatal incidents related to oil and gas well drilling rigs. All of the incidents occurred between 1974 and 1978, and the majority of the fatalities were related to falls from elevations or "struck by" or "caught in" machinery and equipment. The information on which the study was based was obtained from Federal OSHA Fatality/Catastrophe investigations files.

The study found that operational problems (failure to observe or lack of operating procedures such as not tying off when on the monkeyboard or stabbing board) accounted for almost one-half of the fatal incidents investigated. Falls from the derrick or other working surfaces accounted for 75 percent of all the fatalities. The proposed rule will address these problems by requiring training and establishing mandatory operating procedures related to ladders and working surfaces, particularly elevated working surfaces.

The study also found that one-fourth of the fatal incidents were related to hazards with the equipment, material, or the facility. Workers were struck by parts of equipment that separated or failed, by the collapse of the derrick, failure of the ropes, etc. Also, the study shows a variety of occupations were involved in these incidents with the derrickman, floorhand and roughneck among the more frequently involved. The proposed standard contains many provisions directly related to these types of hazards.

The second study (Reference 6) was completed in 1981 and is entitled,

"Comprehensive Summaries of Serious Accidents in the Oil/Gas Well Industry Standard Industrial Classification (SIC)—138." This study found that most of the 206 accidents investigated were caused by inadequate supervision, training, or operating procedures; failure to use fall restraining devices; rig collapse or failures; materials handling problems, equipment and materials striking employees; and contact with live electrical equipment. Other fatalities and injuries resulted from tongs striking employees, flammable liquid or gas fires, elevator failures, or unguarded rotary table or bushings. The information in this study was obtained from OSHA reports of fatality and injury investigations (July 1972–March 1980).

The third study (Reference 5) was completed in 1983, and is entitled "Selected Occupational Fatalities Related to Oil and Gas Well Drilling and Servicing as Found in Reports of OSHA Fatality/Catastrophe Investigations." This study is an analysis of over 453 Federal OSHA Fatality/Catastrophe investigation files which were made between 1977 and 1981. By examining the information in these files, OSHA was able to establish an apparent cause-effect relationship between hazards and accidents that resulted in deaths and/or multiple injuries to the workers in this study. There were 467 workers killed in these accidents. Among the most often cited causes for the 467 deaths were equipment failures, lack of training, improper supervision of new employees, failure to wear personal protective equipment, failure to lockout power sources and failure to guard machinery and equipment.

Based on this information, OSHA is proposing a series of requirements directly related to these hazards which will minimize the potential for an accident that could result in an injury or death.

In order to gather additional data on non-fatal accidents for this rulemaking, OSHA requested the Bureau of Labor Statistics (BLS) to conduct a Work Injury Report (WIR) study (see Reference 7). WIR data collection is carried out by individual states under contract with BLS. Based upon the "first report of accident" filed by the employer with the state, the injured employee is sent a form (and post-paid envelope) with a request that the form be completed and returned to BLS. While the forms are coded by BLS, all information regarding identity of employer and employee are deleted. The data collected over several months were compiled to provide useful information associated with non-fatal accidents and

their causes. The WIR study on the oil and gas well drilling and servicing industry involve reports which describe the event at the time of the injury as well as the activity which preceded it. This study shows that two-thirds of the injuries occurred during drilling operations, with one-fourth of these incidents occurring during tripping in or tripping out operations. This study further demonstrates that workers in this industry are exposed to significant risks on the job and shows the severity of the injuries in these workplaces is greater than in general industry workplaces. For example, the incidents of amputations in the oil and gas drilling and servicing industry are five times the average for all compensation cases.

In addition to the WIR study, the BLS through its annual survey work, has made available data indicating that this industry has a higher injury and illness incidence rate than the private sector "all industry" rate (see Tables I and II).

According to this survey, the injury and illness incidence rate for Oil and Gas Extraction in 1981 was about two times higher (6.6) than the rate for the private sector "all industry" (3.8). In the classification Oil and Gas Field Services, the rate in 1981 was nearly three times higher (9.3) than for "all industry." This rate reflects the number of lost workday cases per 100 full-time workers. In addition, the oil and gas industry injury and illness incidence rate is similar to those in the mining and construction industries—two industries traditionally considered "high hazard" because of their injury and illness incidence rates. Furthermore, the number of lost workdays per 100 full-time workers for the oil and gas extraction (139.4) and oil field services industry (198.1) are significantly higher than they are for private sector "all industry" (61.7).

TABLE I.—OCCUPATIONAL INJURY AND ILLNESS INCIDENCE RATES

[Lost workday cases per 100 full-time workers]

	1981	1980	1979	1978	1977
Private Sector "All Industry" .....	3.8	4.0	4.3	4.1	3.8
Mining .....	6.2	6.5	6.8	6.4	6.0
Oil and Gas Extraction .....	6.6	8.7	7.0	6.9	6.3
Oil and Gas Field Services .....	9.3	9.8	9.5	10.2	.....
Construction .....	6.3	6.5	6.8	6.4	5.9

TABLE II.—OCCUPATIONAL INJURY INCIDENCE RATES

[Lost workday cases per 100 full-time workers]

	1981	1980	1979	1978	1977
Private Sector "All Industry" .....	61.7	65.2	67.7	63.5	61.6
Mining .....	148.4	163.6	150.5	143.2	128.8
Oil and Gas Extraction .....	139.4	152.7	151.2	154.4	143.7
Oil and Gas Field Services .....	198.1	227.6	215.7	229.7	.....

TABLE II.—OCCUPATIONAL INJURY INCIDENCE RATES—Continued

[Lost workday cases per 100 full-time workers]

	1981	1980	1979	1978	1977
Construction .....	113.1	117.0	120.4	109.4	111.5

Another study examined (Reference 18) was made by the Texas Employers Insurance Association. This study of accident costs showed that oil and gas well servicing ranked fourth in severity of the 52 major types of industrial operations in Texas. The study of 300 fatalities in major industry groups showed 27 percent of the fatalities occurred in oil and gas operations. This group also studied 3,054 injuries that occurred during 1980 and 1981. Forty-seven percent of the injuries were caused by being "struck by or striking against," with the hand and head being the part of the body most frequently injured. Three hundred accidents from 1981 were selected for further study, showing that floorhands, normally the most inexperienced workers, had 155 or 51.7 percent of these accidents.

Dr. Maurice Schade of the University of Oklahoma's Petroleum Drilling Safety Research Group (Reference 17) prepared a report in March 1981 in which he examined 561 injuries in the petroleum drilling industry. The study was based on information received from six medium sized drilling companies and covered accidents that occurred during the year 1981 only. There were 1,873 employees who had 561 accidents involving both non-lost time and lost time accidents. The study showed that floorhands were involved in 44 percent of the injuries and most of those injuries involved the handling of tubular goods. From his study, Dr. Schade concluded that workers in the group examined had more than a one in four chance of being involved in an accident on the job (non-lost time or lost time injury).

The National Institute for Occupational Safety and Health (NIOSH) conducted a study of the oil and gas well drilling industry and provided OSHA with recommendations for developing a standard. The study is entitled, "Comprehensive Safety Recommendation—Land-Based Oil and Gas Well Drilling" (Reference 8). In addition to a discussion of the BLS injury data for the oil and gas well drilling industry, an early draft of the study also referenced a study of data NIOSH received on fatalities and injuries that occurred between 1973 and 1978 in Texas and California drilling operations. NIOSH applied these statistics to project estimated fatalities

for the entire drilling industry. NIOSH concluded that the injury incidence and severity rates for the oil and gas drilling industry are more than *six times* the rates of general industry. Allowing for the possibility of error as much as a factor of 2, the potential for sustaining a recordable injury was still three times higher than for general industry. NIOSH also analyzed 603 accident reports from OSHA investigation files, company accident reports, workers compensation reports and published case histories related to drilling. There were 106 deaths associated with these accidents. Nearly half of the accidents (45.8%) and over half (56%) of the fatalities involved three categories—falls from the derrick, handling drill pipe, and tong operations. Falls from the derrick accounted for 31 percent of the fatalities in this study; handling of drill pipe resulted in 16 percent of the fatalities, and tong operations for nine percent of the fatalities. The NIOSH document also referenced a study compiled by the International Association of Drilling Contractors entitled, "Drilling Accident Analysis, 1979." This study also establishes that there is a significant risk of injury to workers in the drilling industry. Finally, the NIOSH document includes recommendations for a drilling standard to address the unique hazards not covered by existing OSHA general industry standards.

In addition to comments on the proposed rule, OSHA is seeking comments, information and data on the following issues which it wishes to resolve in this rulemaking:

A. Can and should fall arrest devices be used on servicing and workover rigs to protect personnel riding the hoisting equipment? What problems would this create in rig up and in work operations? What costs would be involved in additional rig up time and in work operations and other related costs?

B. Are manual shutoffs of air intake sufficiently rapid to prevent diesel engine runaway in the event of a gas leak or blowout? How can and should the gas be detected? Are automatic controls and actuators required? What costs and benefits would such controls bring? What sensing mechanism should be used (e.g., engine overspeed, gas detector, other)?

C. OSHA had originally intended to include an exemption from the General Industry Standard for perimeter guarding. This exemption would have relaxed the requirement for guardrails on all rigs 4 feet or more off the ground by not requiring perimeter guardrails unless the rig was 10 feet or more above the ground. OSHA subsequently received data from BLS (Reference 7)

that showed that a significant number of injuries occurred to workers who fell from heights of 10 feet or less. Because of this, OSHA has decided not to propose this exemption at this time. However, OSHA would like comment or information about injuries that have occurred when workers were not able to make a rapid escape from the rig floor during an emergency because guardrails limited or prevented their rapid escape.

D. Under what conditions would the need for blowout preventers (BOP) be unnecessary? Can this decision be based on information about geological strata and other scientific evidence? Are there known situations or areas where it will not be necessary to use blowout prevention equipment? What market incentives are already available that would encourage the use of blowout prevention equipment (lowered insurance premiums, reduced worker's compensation costs, and reduced tort liability) and hence render a specific regulatory requirement unnecessary?

How frequently should blowout prevention equipment be tested? What types of tests are appropriate and adequate? Are there adverse effects on equipment operation and reliability resulting from frequent testing of blowout prevention equipment? Should OSHA require blowout prevention (BOP) classroom training for one person per rig site? What schools should be recognized for this training? What costs are involved?

Is there any additional information that can be provided on BOP to assist the Agency in rulemaking?

E. Recently OSHA has received several reports of fatalities and serious injuries attributed to the placement of operating controls on the control panel of the drillers console. The reports indicated that several controls were located close to each other. These controls had identical operating characteristics and were equipped with identical knobs in spite of the fact that they were used to activate different powered functions. Apparently, in several instances the driller activated the wrong control causing needless injuries and fatalities. In one case, during the course of drilling, after the kelly had been "drilled down," the driller had stopped the rotary table and begun to hoist the drill string. The kelly bushing started rising with the drill string and the driller stopped hoisting to allow a crewman to free the bushing. While the effort to free the kelly bushing was going on, other crew members prepared to break out the kelly. The tongs were hanging freely suspended by the counterbalance line. Once the bushing was free, the driller reached for

the hoisting control but instead activated the control for the breakout cathead. (On this rig, controls are located less than six inches apart and were equipped with identical knobs.) This caused the breakout cathead to take up the slack in the tongs snub line which caused the tongs to swing violently. The tongs struck a rig hand and threw him against the drawworks causing serious injury.

OSHA is seeking comment on the extent of this problem in the industry; the economic feasibility of requiring distinctive knobs for each control; and other methods of abating this type of hazard. Additionally, should OSHA require that all control panels be standardized in relation to the placement of operating controls, with each control having distinctive knobs? If OSHA requires this, should OSHA require existing rigs to be brought into compliance, and what period of time should be allowed to bring rigs into compliance? What are the costs of requiring new rigs to have controls that minimize the described hazards? What costs are imposed on retrofitting existing rigs?

Finally, OSHA seeks accident and fatality reports related to these types of problems.

F. Should employers be required to fill or cover all holes or depressions in the area of the worksite into which employees could trip or fall?

G. OSHA recently promulgated a revised hearing conservation amendment to its occupational noise exposure standard (48 FR 9738, 3/8/83). The amendment required the establishment of a hearing conservation program including exposure monitoring, audiometric testing, and training for all employees who have occupational noise exposures equal or exceeding an eight hour time weighted average of 85 dBA. OSHA decided to exempt the oil and gas well drilling and servicing industry from the requirements of the revised hearing conservation amendment because of the pending project to develop a special standard for this industry. Specifically, OSHA stated:

A combination of factors, including tremendous variation in working conditions, high mobility of operations, extremely high employee turnover rate, and limited accessibility of many worksites, convinced OSHA that employees would be better served by developing a standard more specifically tailored to the needs of this industry. (Citations omitted); footnotes 53, 48 FR at 9775.

For example, Dresser Industries, (an employer with many locations ranging from multi-employee worksites to

innumerable small mobile field servicing units) while recognizing the "value . . . and need of effective hearing conservation programs," felt that a more performance oriented approach to hearing conservation than permitted under the general hearing conservation amendment was necessary. (See Ex. 327-146A.)<sup>1</sup>

Dresser believes that the ideal hearing conservation program is one developed or approved by knowledgeable experts in the field. Such a program will be developed around the actual conditions in the workplace and will be designed to achieve four objectives. First is the identification of employees who are likely to be exposed to noise in excess of 85 dBA (TWA). Second is the timely taking of baseline and periodic hearing tests of such employees under acceptable conditions. Third is the informing of such employees in general terms of the potential hazards of continuous loud noise, and informing any such employees who the testing shows may be incurring unusual hearing loss, of such loss. And fourth is the requiring of suitable hearing protection in cases that warrant this.

Such a program appears to be contemplated by the possible alternative (to the hearing conservation amendment which was suggested during the administrative reconsideration of the amendment) . . . (Ex. 327-146A, pp. 1-2.)

The alternative reads as follows:

1. Employers shall conduct audiograms annually of every employee exposed to noise in excess of an 8-hour time weighted average sound level (TWA) of 85 dBA,<sup>2</sup> according to standards on audiometers and audiometric test rooms established by the American National Standards Institute,<sup>3</sup> and under the supervision of a qualified technician;

2. Such audiograms shall be reviewed annually by a qualified audiologist, otolaryngologist or physician to identify employees whose hearing acuity has diminished more than normal;

3. Employers shall instruct all employees identified under paragraph 2 in the proper use of hearing protection when working in noisy areas and shall take appropriate measures to enforce the use of suitable protective devices for those employees when they are exposed to noise levels in excess of an 8-hour time weighted average sound level (TWA) of 85 dBA.

Specifically Dresser suggested that modifications to the hearing conservation amendment to

accommodate the peculiarities of the industry might be useful. It was suggested that employers within this industry have the option of subjecting employees to audiometric testing and hearing protection provisions without what were viewed as burdensome monitoring requirements. "Such a provision will allow a higher degree of protection to those marginally exposed employees without requiring an immediate and highly precise reassessment of exposure." (Ex. 327-146A, p. 4.) A relaxation of the requirement to obtain baseline audiograms within a short period of time was also suggested. Dresser suggested a one year period be allowed to obtain audiograms if hearing protection were required until the base line is obtained (Ex. 327, 146A p. 5). Similarly, R. Brisnehan of the Petroleum Equipment Suppliers Association and G. McKnown of the International Association of Drilling Contractors suggested that extending the period of time in which to obtain a baseline audiogram to one year would solve several of the industry's problems in complying with the audiometric test provisions of the amendment (Tr. Vol. I-B, p. 295, 3/25/82).

Similarly, with regard to the training provisions, several participants indicated that these requirements presented special problems for the oil and gas well drilling and servicing industry. As Mr. McKnown testified at Tr. 296, "We don't have any problems with the training requirements \* \* \*. Training is an excellent idea. No problems on that." Mr. Carlton, representing the Association of Oilwell Servicing Contractors and Mr. Karger representing a number of employers in oil and gas well drilling expressed similar views (Tr. 162 and 188 respectively).

On the other hand, several participants argued that special characteristics unique to the industry made it inconvenient or infeasible to comply with the hearing conservation amendment as it applied to general industry. For example, high turnover rates ranging from 200 to 600% combined with mobile work sites, frequently in remote locations and a decentralized hiring procedure all tend to negatively impact the feasibility of conducting baseline audiograms within a four month period. (See Tr. 156, 169 and 173). These factors, it was argued, would further create costs of compliance that were prohibitive. Even the usefulness of baseline audiograms was questioned in an industry with such a high turnover rate where many employers receiving the baseline audiogram would not still

be employed by the same company for the annual audiometric testing which follows the taking of a baseline audiogram. The existence of long term employees in the industry however, was attested to by several parties: McKnown, Tr. 293; Carlton, Tr. 162; Karger Tr. 184.

Although industry representatives argue for exemption from the general industry hearing conservation standard, none seriously disputed the significance of noise exposure in the industry or the possible need to some kind of hearing conservation regulation. Mr. Karger argued that the exemption should remain in effect "at least to a point in time when the unique problems of the industry can be addressed and alternatives conducive to the realities of land based oil and gas well drillings \* \* \* can be developed." (Tr. 170)

In consideration of the evidence presented in the Hearing Conservation Amendment proceeding, some of which is summarized above, and the seriousness of occupational hearing loss and impairment, OSHA, in this rulemaking, would like to examine more closely the unique problems of the industry with regard to noise exposure and hearing conservation. As an outcome of this rulemaking the exemption found in 1910.95(o) will be considered for modification based on the record developed. OSHA therefore seeks comment on the following questions in order to determine whether an effective hearing conservation program for the oil and gas well drilling and servicing industry can be developed and, if so, what elements would be appropriate.

1. What is the nature and extent of worker exposure to noise in this industry?

2. Which job tasks and locations on rigs and how many employees have noise levels of 85 dBA or more (expressed in time weighted averages (TWAs))? List job tasks and estimate numbers of employees with exposures at 90 dB, 95 dB and 100 dB or more.

3. To what extent is monitoring necessary to assure an effective hearing conservation program in this industry?

4. What alternatives to monitoring could provide information regarding when hearing protectors are needed and the degree of attenuation that hearing protectors need to provide?

5. What is the employee turnover rate? To what extent do employees tend to remain in the industry regardless of employer? What is the average number of years in the industry per employee? Can this be broken down by operation?

<sup>1</sup> For the purpose of this discussion on the hearing conservation amendment all record and transcript citations are referencing the hearing conservation amendment docket, H-011.

<sup>2</sup> See Appendix A (of 29 CFR 1910.95).

<sup>3</sup> American National Standards Institute (ANSI) Specification for Audiometers, S3.6-1969, and the Institute's Specification for Audiometric Test Rooms, ANSI S3.1-1977. Audiometers shall be calibrated annually to ensure the standard is met. ANSI S3.1-1977 must be followed for testing performed at frequencies of 1,000 Hz and above; for testing below 1,000 Hz, ANSI S3.1-1960 may be used.



6. Would a requirement that baseline audiograms be obtained within one year rather than six months still provide for an effective hearing conservation program for long term workers in this industry? Should employers whose employees have eight hour TWA's between 85 and 90 dB be given longer to obtain baseline audiograms than employers whose employees have extremely high exposures?

7. Are there any alternatives to audiometric testing to ascertain that workers are not losing hearing and that the hearing conservation program is effective?

8. Describe the present effort of your company to conserve employee hearing including the specific elements of the hearing conservation program?

9. How can the various key elements of the hearing conservation program set forth in 29 CFR 1910.95 be adopted to fit the particular characteristics of the oil and gas well drilling and servicing industry? Would the three paragraph alternative set forth above provide employers with enough flexibility for compliance and assure that employees are adequately protected?

All submissions and testimony presented by interested parties in the hearing conservation amendment proceeding and relevant to this industry are being included in the Oil and Gas Well Drilling and Servicing Docket, No. S-360, and will be fully considered in this rulemaking. OSHA encourages, however, continued participation by these parties in this rulemaking in order to help resolve these difficult issues.

### III. Summary and Explanation of the Proposal

This proposal adds to existing general industry regulations a number of new provisions which will directly address the hazards of a single industry—oil and gas well drilling and servicing. In paragraph (a), OSHA defines the scope and application of the standard proposed for oil and gas well drilling and servicing operations. The standard contains requirements for the control of hazards or workplace situations unique to oil and gas well drilling and servicing operations.

It is OSHA's intent that the scope of this standard include all drilling, servicing and special services operations performed on wells as specified in proposed paragraph (a)(2) of this standard. Operations performed to prepare the site for drilling, such as road construction, grading, and digging of earthen pits are covered by the OSHA Construction Standards (29 CFR Part 1926). Therefore, these operations are not addressed by this proposal.

However, it should be noted that the Coast Guard has authority for occupational safety and health on the Outer Continental Shelf (OCS) pursuant to 43 U.S.C. 1333(e), 1347, and 1348, although OSHA has authority pursuant to 29 U.S.C. 653(a) and 43 U.S.C. §1347. Pursuant to 29 U.S.C. 653(b)(1), providing that OSHA does not apply to working conditions with respect to which other Federal agencies exercise statutory authority to prescribe or enforce occupational safety or health regulations, OSHA and the U.S. Coast Guard, in December 1979, signed a memorandum of understanding which delineated their respective authorities and responsibilities and which established procedures for conducting inspections and investigations of OCS operations. This agreement, under which the Coast Guard and primary responsibility for the safety and health of employees engaged in OCS operations, was based on a recognition of the Coast Guard's extensive regulations, regular presence on the OCS, and consequently of that agency's superior ability to make onsite visits to offshore rigs located there. Further, the Coast Guard has regulations dealing with mobile offshore drilling units, which are inspected vessels as defined by the Coast Guard (46 CFR Subchapter I-A). Pursuant to a memorandum of understanding signed by OSHA and the Coast Guard in March 1983, the Coast Guard, with certain exceptions not relevant here, has exclusive authority with respect to the occupational safety and health of seamen on inspected vessels because of the Coast Guard's comprehensive regulation of these vessels.

In paragraph (a)(2) OSHA is proposing the application of the standard. The requirements of this standard would apply to rigs performing drilling, servicing or special services operations on exploratory wells, development wells, injection wells and water wells drilled to support oil and gas recovery operations. Excluded from the requirements of this section are: cable tool drilling, drilling for seismic tests and subsoil structural investigations, drilling for minerals such as sulfur, and drilling water and brine wells for purposes other than in support of oil and gas recovery. OSHA data research was targeted to rotary drilling which represents the bulk of the drilling industry. Other areas excluded above are unique enough to be addressed individually and may be in the future if data show this is necessary.

Additionally, all drilling, servicing and special services operations employers would not be required to comply with

every proposed requirement contained in the standard. Paragraphs (c), (d), and (e) of the proposed standard would apply to all operations. The requirements of paragraph (f) of the proposed standard would only apply to those operations specifically addressed.

In paragraph (b) OSHA proposes a number of definitions which would clarify the meaning and intent of certain terms contained in the proposed standard. Many of these definitions are consistent with those published by the University of Texas, Petroleum Extension Service, in their primer booklets for Oilwell Drilling and Oilwell Service and Workover and in their Dictionary of Petroleum Terms (see References 22-24). However, some are provided which augment these. They include, but are not limited to the following: imminently dangerous to life and health, confined spaces, drilling, frozen plug, and headache post.

In paragraph (c) OSHA proposes general requirements for all operations.

Paragraph (c)(1) proposes medical and first aid requirements in addition to those found in Subpart K of this Part. Considering the type and frequency of injuries experienced in this industry (see References 4-8 and 17-18) and the fact that, in many instances, these operations take place in remote locations without ready access to emergency medical services, OSHA believes the additional requirements being proposed will result in saving lives and reducing injury severity.

In many cases, slips and falls or being struck by machinery or equipment result in back injuries, shock or fractured bones and are all too common in this industry (see References 4-8). OSHA believes that transportation in an inappropriate manner of a worker with a back injury or broken bones, or one suffering from shock and trauma would aggravate these types of injuries, in some cases with catastrophic consequences. For example, workers with back injuries or suffering from shock should not be transported in the cab of a pickup truck in a sitting position. Following standard practices for first aid, the victim should be placed in a horizontal position, and then transported to the hospital or clinic.

OSHA is also proposing that a contingency plan which details the procedures for obtaining prompt medical assistance be prepared in advance and implemented when needed. OSHA believes the concept of preplanning for medical emergencies will better enable the employer and his employees to be prepared. Employees should know what actions to take in the event of a medical

emergency so that treatment can be promptly provided to reduce the severity of the injury. The contingency plan must prescribe, at a minimum, how to establish communication with medical assistance, the location of the communication instrument and details of the arrangements made to transport injured employees.

Paragraph (c)(2) proposes that an emergency action plan which meets the requirements of § 1910.38(a) be developed in advance and implemented when needed for all rigs and their operations. OSHA believes it is necessary for the employer to preplan for emergencies so employees involved in these operations know what actions are required of them during emergency situations. Preplanning will enhance safety for the entire crew.

In paragraph (c)(1) and (c)(2) just discussed, OSHA is proposing requirements for a medical contingency plan and an emergency action plan. The proposal provides the employer with alternative means of compliance for these provisions. The options include development of a written plan, available at the worksite in a location known to the employees; or preparation of a plan, employee training in the provisions of the plan, and certification by the employer that these steps have been taken.

Paragraph (c)(3) of the standard proposes training requirements for employees working in this industry. OSHA believes that an effective training program will enhance worker safety by teaching employees how to recognize hazards and the procedures or means to control or avoid them. The training program will familiarize employees with necessary personal protective equipment and the proper method of use, inspection and care of this equipment, and will make employees aware of special requirements such as lockout and tagout procedures and confined space entry procedures. Trained employees will be better able to avoid being injured while performing such work (see References 4, 6, and 8). It is OSHA's intent that employees receive some training prior to beginning work and that this training should be augmented and repeated from time to time.

Paragraph (c)(4) proposes specific requirements for the unique hazards of over-water operations. These requirements would assure that OSHA's standards for water rescue and flotation equipment conform with current U.S. Coast Guard regulations for offshore rigs under their jurisdiction.

Paragraph (c)(5) of the standard proposes housekeeping requirements for

all operations. OSHA believes that a conscientious effort to eliminate slipping and tripping hazards and hazards due to flammable and combustible liquids will produce a significant decrease in injuries in the drilling, servicing and special services industry (see References 4-8).

Illumination requirements for all rigs are proposed in paragraph (c)(6) of the standard. OSHA believes minimum lighting levels are necessary to help minimize slips, trips, and falls and to allow work to continue safely in other than daylight hours. These lighting levels are consistent with ANSI recommendations for other industries. Injuries have occurred where adequate lighting was not provided (see References 5-8).

In paragraph (d) OSHA proposes specific requirements for drilling, servicing and special services workplace situations which apply to all types of operations.

OSHA is proposing, in paragraph (d)(1), requirements to assure the safe raising and lowering of derricks or masts and related rig-up operations.

The first two proposed requirements in paragraph (d)(1) address preplanning the arrangement or placement of equipment and outbuildings to minimize environmental problems like water drainage and to assure the prescribed clearances for buildings and equipment are maintained. OSHA believes that preplanning is essential. It will enable the employer to foresee hazardous situations and plan to avoid them. Additionally, this will help the employer avoid the problems of having to move equipment and outbuildings once they are initially set.

Additionally, paragraph (d)(1) prescribes the need to perform a visual inspection of the raising and lowering mechanism before operations begin. This check can catch any obvious problems that can be seen with the naked eye before the equipment is operated. Also, a check needs to be made of the mast to remove any loose tools or materials before movement begins. Otherwise, these must be secured to prevent them from falling on employees. As a general safety precaution against the possibility of line or derrick member failure, employees are to remain clear of the area and are not to be under the equipment when the derrick or mast is being raised or lowered.

The sixth proposed requirement addresses a floor opening hazard that can occur during rig-up operations. During these operations, the rotary table opening is to be covered until the equipment is put in place. This is to

prevent employees from inadvertently falling into the floor opening. If covers cannot be used, guardrails or other means may be used provided the safety of the employees can be assured.

Paragraph (d)(2) of the proposed standard details OSHA's requirements for emergency escape systems. Under emergency conditions, such as a blowout or rig fire, it would be impossible for the derrickman to use normal means of egress from the elevated work station. Therefore, OSHA is proposing that an emergency escape system be provided for those employees working in the derrick or mast (see References 1-8).

In the first two requirements of paragraph (d)(2), OSHA proposes to require that an emergency means of escape be rigged and secured from the derrickman's work platform upon completion of rig-up operations. The next requirement proposes a similar duty when stabbing boards are used, except that the emergency escape must be available before a crew member is required to work in that area. OSHA believes these requirements are necessary due to the fact that shallow entrapments of gas, such as methane or hydrogen sulfide, can be present and drilling into these can cause a blowout and rig fire which could cause death and serious injury. Without these precautions and escape systems, anyone working on the derrickman's platform would have little or no chance of escaping these dangers.

OSHA proposes in the third requirement in paragraph (d)(2) that the emergency escape route be kept clear of obstructions, be arranged to carry the employee away from the area of potential danger and allow the employee a safe landing. OSHA feels these requirements are necessary to insure that the escape route can be used for its intended purpose without further endangering the employee.

OSHA is proposing in the fourth requirement that the employer make sure that tension on the escape line will permit a safe landing for the user. When an escape line is used as part of an emergency escape device, proper tension on that line is a critical factor. Either excess or insufficient line tension can result in injuries to employees using the line.

In the fifth requirement OSHA is proposing that emergency escape devices without automatic velocity limiting controls be equipped with a braking device which can be operated by the employee using it. The braking-device requirement that OSHA is proposing is essential to allow the

employee a safe landing when using this type of emergency escape device.

The last requirement of paragraph (d)(2) addresses emergency escape units equipped with automatic velocity limiting devices, and proposes to clarify the intent of a safe landing as it is to be applied when this type of unit is used. Additionally, OSHA proposes to limit the speed of these devices at the time of landing and to require separate anchors for escape lines in those cases where use of the rig guying anchors could pose a hazard to the employee. OSHA believes these requirements are necessary to ensure the safe use of these devices. The maximum landing velocity OSHA is proposing is 15 ft/sec which is equivalent to about 10 miles per hour. Speeds at landing in excess of 15 ft/sec have the potential of causing serious injury to the employee, further delaying the employee from evacuating the vicinity after landing (see References 5-8).

Paragraph (d)(3) of the standard proposes minimum requirements for fire prevention and protection covering incipient fire fighting equipment, ignition source control and control of fuel sources including iron sulfide.

In the first three requirements of paragraph (d)(3), OSHA proposes the minimum numbers and types of fire extinguishers which are to be present on rigs. Requirements for fire extinguishers to be installed at all workplaces are those specifically addressed in Subpart L of this Part. These proposed requirements differ from Subpart L in that OSHA is specifying the type and number of extinguishers necessary for rigs used in this industry. These requirements are based on, and in line with, current industry recommendations and State standards (see References 1, 2, 3, and 9-16).

The fourth requirement of paragraph (d)(3) addresses the maintenance, testing, and inspection of fire extinguishers and is a cross reference to the requirements of Subpart L of this Part. This is done to alert the employer that there are additional requirements for this equipment in Subpart L.

In the remaining seven requirements of (d)(3) OSHA is proposing work practice requirements or other safety measures controlling flammable liquid vapor accumulations; keeping ignition sources at a safe distance away from the wellhead, and other measures to minimize the potential of a fire. OSHA believes these requirements or the equivalent measures are necessary to isolate potential fire hazards (flammable liquids and other fuel sources) or sources of ignition (open flame heaters, portable light plants and others) thereby

reducing the possibility of fire and/or explosion (see References 5, 6, and 8).

In paragraph (d)(4) OSHA is proposing requirements for the safe handling of drilling fluids containing hazardous substances and chemicals. Examples include calcium oxide and sodium hydroxide used for pH control. Personal protective equipment and work procedures are addressed.

The first duty in paragraph (d)(4) proposes safe handling instructional requirements for employees required to handle hazardous substances, and the next requirement proposes that those employees be required to wear appropriate personal protective equipment. Because of the high potential for exposure to inhalation hazards, skin contact, absorption, and other hazards in these situations, OSHA believes that these requirements are necessary (see References 5, 6, and 8).

The third requirement proposes that eyewash equipment be readily available when using acids. This requirement is based on OSHA's belief that in most, if not all, instances when acid is used, it is used in large quantities and is injected into, and retrieved from, the well under pressure. Caustics, on the other hand, are usually mixed into the drilling fluid at the mud hopper; are in a pelletized or other easily handled form; and are diluted by the drilling mud. Thus OSHA is proposing that three 1 quart bottles of an approved eyewash solution be available.

In paragraph (d)(5) OSHA is proposing requirements to assure safe operation near energized power lines to prevent electrocutions.

The requirements of paragraph (d)(5) propose clearances for rig operations or material storage near or under electrical transmission or distribution lines. Also it proposes requirements for notification of the owner of the lines if lines are to be relocated. These proposed requirements are similar to § 1910.180 and OSHA believes they are necessary for this industry to assure that employees will not be exposed to electrical shock hazards (see References 5 and 6).

OSHA proposes in paragraph (d)(6) requirements for handling and racking pipe, drill collars and similar equipment to prevent employee injuries due to being "struck by" moving pipes or being "pinned against" stored pipes.

The first requirements of paragraph (d)(6) propose design requirements for storage racks. These requirements are intended to control hazards resulting from collapsing racks and from tubular materials rolling off racks. These requirements are based on industry recommendations and practices, and the

need for these requirements is substantiated by injury and fatality reports (see References 1-3, 6-8, and 17-18).

In the third requirement of paragraph (d)(6), OSHA proposes to prohibit employees from standing or walking between any pipe rack and a load of pipe being loaded or unloaded. OSHA believes this practice is very dangerous and injury and fatality reports substantiate this belief (see References 5-7).

The fourth provision of paragraph (d)(6) proposes that pipe or other tubular material be secured at all times except when it is actually being worked. OSHA agrees with industry recommendations (see Reference 1) and believes these requirements will eliminate hazards resulting from unsecured material falling or shifting (see References 5-7).

The last requirement of paragraph (d)(6) proposes that drainage of the drill stem stands be provided to minimize ice plug formation. In this instance, OSHA again agrees with industry recommendations (see References 1 and 2) and feels that these requirements are necessary to prevent injury to crew members working in the derrick. The hazard occurs when a stand containing an ice plug is run into the hole, and the ice plug is then blown out by well pressure, thus possibly causing injury to the worker.

OSHA is proposing in paragraph (d)(7) to prohibit the riding of hoisting equipment unless certain conditions exist and certain requirements are met. These requirements include the wearing of a full-body harness attached to a lanyard, the use of an emergency stop device and specific work practice requirements. Although OSHA does not condone this practice, it is felt that workplace situations could make this practice preferable to other available alternatives. For example, in the servicing industry, an employee is frequently required to reach a work station in the derrick several times during the work day. OSHA believes it may be less of a hazard to allow the employee to ride the hoisting equipment under the controlled conditions prescribed by this paragraph than to have a physically fatigued employee make the climb.

In paragraph (d)(8) OSHA is proposing requirements for drilling, servicing and special services operations performed in areas where a potential for exposure to hydrogen sulfide gas exists. This gas is a poison which, at low concentration, will desensitize one's sense of smell. These requirements also propose establishing



and implementing a monitoring program in specified areas of the rig using automatic environmental monitoring systems, detector tubes, etc., to assure the safety and health of employees exposed to hydrogen sulfide. Additionally, OSHA is proposing that the details of this monitoring program and its procedures be available in written form for review at the worksite. OSHA believes that this precaution is necessary because of the extreme toxicity of hydrogen sulfide.

In addition, OSHA proposes exemptions from the requirements of monitoring where the potential for exposure to hydrogen sulfide has been determined not to exist such as in many fields where drilling has been performed over many years and these areas are known to have no hydrogen sulfide exposure potential. Employers operating rigs in areas with known hydrogen sulfide exposure potential or in areas with unknown or inconclusive data regarding exposure potential must meet the requirements for monitoring.

As part of this paragraph, OSHA is proposing requirements for respiratory protection equipment to be used in areas where exposure to hydrogen sulfide exceeds the permissible exposure levels in Subpart Z of this Part. For example, exposure to 500 to 700 ppm causes unconsciousness to occur rapidly with cessation of breathing occurring in a few minutes. A hydrogen sulfide release can result in concentrations that far exceed this level and such releases have occurred on oil and gas well rigs (see Reference 5). OSHA believes that escape respirators are absolutely necessary for all crew members where exposure to hydrogen sulfide may be present. Additionally, OSHA believes that approved positive pressure respirators are necessary for any extended work in a hydrogen sulfide atmosphere that exceeds the levels allowed in Subpart Z of this Part.

Where an automatic hydrogen sulfide environmental monitoring system is used, it shall be connected to an employee alarm system. OSHA believes that in order to be totally effective, the monitoring system must provide adequate warning so that the emergency action plan (discussed earlier) can be properly activated with regard to all employees on the site—not just those at or near the monitoring readout.

Additionally, this paragraph proposes requirements for the testing and maintenance of the monitoring system. OSHA feels that untested or poorly maintained monitoring systems are as dangerous as not having a system. Improperly maintained or untested systems may lead to a false sense of

security for employees who rely on them for warning. This could have serious consequences should the system fail during an actual hydrogen sulfide release.

In the final requirement of paragraph (d)(8), OSHA is proposing all rigs, except those excluded from monitoring, be equipped with an operable automatic hydrogen sulfide environmental monitoring system by July 1, 1987. OSHA believes that these types of systems represent an effective means of warning employees about an actual exposure to hydrogen sulfide before it becomes dangerous. The extended effective date will allow employers to phase in these systems in an orderly fashion as availability and work situations dictate.

OSHA has several reports of fatalities involving persons entering confined spaces associated with oil and gas well rigs. In common with other industrial settings, it is not only the employee gaining initial entry and being overcome who proves to be a fatality, but would-be rescuers are also overcome and die (see Reference 6).

Paragraph (d)(9) addresses hazards associated with personnel entering confined spaces, whether inadvertently or because of work requirement within these spaces. Most confined spaces in and around rigs are tanks. Under certain circumstances, cellars and pits are also considered to be confined spaces for the purposes of this regulation. Criteria for deciding if an open-topped space is to be considered a confined space is:

- (1) Depth four feet or more, and
  - (2) Depth greater than one-half the smallest dimension of the top opening.
- Are these criteria appropriate to assure adequate ventilation under the worst environmental conditions? Are there alternative criteria more appropriate to define confined spaces?

OSHA has received reports of entry problem in and around tanks where personnel are required to monitor the in and out flow of fluids. These describe how personnel enter or fall into tanks during well fracturing operations, and are then overcome and die. Multiple fatalities have occurred when other workers attempted a rescue and were in turn overcome and killed.

The proposed rules require posting of caution signs adjacent to openings or accesses into confined spaces. Barriers are required to prevent inadvertent entry. The proposed rules require warning signs adjacent to those confined spaces employees may enter to warn of entry hazards and to identify persons who must authorize entry.

This paragraph requires employers (who expect their employees to enter

confined spaces) to set conditions prior to entry, procedures to be followed at entry, and procedures for mitigating hazards within or associated with the confined space. It is OSHA's opinion that the majority of problems will be addressed by these requirements, and the steps taken by employers in fulfilling these requirements will assure that such work can be done safely.

The remainder of the paragraph is directed toward procedures to affect rescue in the event of an emergency where an employee is unable to escape on his own. Training requirements are established for designated rescuers who may enter confined spaces. Also included are requirements for backup personnel and for rescue equipment.

In paragraph (e)(1) OSHA is proposing general equipment requirements for all operations. The implementation of specific work practices related to general rig safety is included.

The initial two proposed requirements are to eliminate falling or tripping hazards caused by uncovered or unguarded openings in the rotary table and unoccupied mouseholes and ratholes. Accident reports seen by OSHA indicate that falling or tripping hazards are a major cause of accidents in this industry (see References 4-8). These hazards are recognized within the industry and are the subject of industry standards and recommendations (see References 1 and 2).

OSHA's current General Industry Standard requires that guardrails be provided along the perimeter of working platforms which are 4 feet or more above the ground. As mentioned earlier, OSHA had considered relaxing this requirement so that guardrails would not be required unless the platform was 10 feet or more above the ground. OSHA has since decided against this for the reasons previously mentioned. OSHA, however, is still willing to consider an increase of the height requirement above 4 feet if sufficient data are made available to justify any change. This paragraph also allows the use of a chain across the vee-door in lieu of guardrails. Guardrails across the vee-door could pose a hazard during the movement of tubular materials.

The fourth requirement of paragraph (e)(1) is proposing that a ladder or stairs be provided for employee access and egress to cellars of five (5) feet or more in depth. OSHA believes that providing safe access to and exit from this restricted area is necessary. Additionally, in emergency situations, safe access and/or a means of rapid egress could facilitate rescue operations or well control measures.

OSHA is proposing in the fifth requirement that employers implement a lockout and tagout procedure which will render the equipment inoperable and ensure that power sources may not be energized. This requirement is intended to protect employees who are cleaning, servicing, adjusting, or maintaining equipment. Accident and fatality reports show that the inadvertent or accidental activation of machinery or equipment while an employee is servicing them is a serious problem in this industry, resulting in several fatalities and/or traumatic injuries each year (see References 5 and 7). OSHA believes that a lockout and tagout program based on the requirements of this proposal will effectively protect employees who are required to perform maintenance of equipment, etc., proximate to hazards likely to cause injury.

The sixth requirement proposes that all employees on the rig site wear safety-toe footwear. OSHA believes that the nature of the work involved makes this requirement necessary to prevent or reduce injuries to the foot. Accident statistics substantiate OSHA's belief (see References 5-7).

The seventh provision in paragraph (e)(1) proposes to prohibit operation of machinery without all guards in proper position and these guards are to be in good, safe condition. Exceptions are allowed for repair, maintenance and testing of machinery. OSHA feels that accident data indicate that accidents caused by improperly used machine guards or lack of machine guarding represent a significant percentage of the accidents reported in the industry (see Reference 5).

The last two requirements of paragraph (e)(1) propose requirements for wire rope used for hoisting purposes on rigs. These requirements include a minimum design factor of three (3) for all regular or normal operations; visual inspection on a daily basis; and replacement of rope found to be weakened due to wear or damage. OSHA believes that these requirements are necessary to assure employee safety during hoisting operations. Weak or damaged rope can break which could result in employee injury from line recoil or from an overhead load falling on the employee.

In this paragraph, OSHA also is proposing to exempt employers from creating or maintaining written records of the inspections. OSHA feels that compliance with the inspection requirements of this paragraph, and the correction of any defects found are the important features of this requirement. Although written records are not required, the employer must certify that

inspections and any needed corrections have been performed. Also, chain or wire rope connections to equipment are to be secured positively so that inadvertent separation could not occur (see References 5 and 6).

OSHA has received reports of fatalities and serious injuries sustained by employees following the collapse of derricks and masts. Additional accident reports have been received of rig collapse where employees sustained less serious injuries. These situations are usually the direct result of misuse or misrigging of the equipment. Paragraph (e)(2) addresses these problems and provides criteria on correct design and rig-up procedures to be followed including procedures to repair damaged rigs. Provision is made to allow the use of equipment under emergency conditions where a greater hazard may be created by not controlling the emergency. For example, during a blowout, a damaged derrick or mast cannot be removed until the well is brought under control. Manufacturer's recommended limits are incorporated to prevent misuse of derrick components that would stress them and lead to failures (see References 5 and 6). Repairs that fail to meet specifications could lead to a rig collapse.

Provisions are included to ensure that repaired and remanufactured equipment meet or exceed the original design specifications. Ordinarily, structural strength to original specification would be determined by certification by the manufacturer or by a professional engineer; and these are certainly acceptable. However, OSHA recognizes that there are employers with the competence to complete repairs and to ensure their adequacy. Provision is made for self-certification in these cases.

OSHA is proposing in paragraph (e)(3) to require the use of ladder safety devices or other acceptable devices on all derrick or mast ladders to prevent injuries or deaths due to falls. In this paragraph OSHA provides general guidance as to what is and what is not acceptable as a ladder safety device. The use of a climbing assist device (counterweight) without the means to control the descent velocity if an employee should fall is not acceptable as a ladder safety device since it does not arrest the fall or allow the safe landing of the employee. If the weight of the counterweight is greater than the employee's weight, which could cause the employee to be pulled up into the derrick or mast, it is not acceptable. The proposed rule requires the counterweight of a climbing assist device to be of such weight so as not to

exert an upward force greater than 90 percent of the user's weight. Also, means shall be taken to prevent the counterweight from falling if the sheave or line breaks. OSHA believes these precautions are necessary due to the number of injuries and deaths reported in this industry which were the result of falls or equipment failure which resulted in falls (see References 4-7).

In paragraph (e)(4) the factors which affect rig stability and use are addressed. OSHA has received reports of fatalities and has investigated accidents involving overturned rigs. This paragraph addresses the need for foundations and guy lines which are adequate for the anticipated loads that may be imposed. Requirements for inspection and testing are included to help assure adequacy of anchors. Temporary, non-standard items such as trees and rocks are specifically prohibited for use as anchors due to the number of unknowns of these items (see References 5 and 6).

Trees, rocks, and other natural occurring items have been prohibited as anchors due to the number of unknown properties of these items. It has been pointed out to OSHA that sound, substantial trees with good tap root structures (e.g. various oaks, hickories, walnut) are frequently available in hilly locations, and it may be a better alternative to utilize such trees rather than to rely on anchors set in newly disturbed soil. What experience factors are available to ascertain suitability of trees as anchors? What method of fastening guy lines to trees is suitable? Is the information and data developed by the Forest Services, U.S. Department of Agriculture for skyline logging anchors applicable to evaluating and selecting trees as anchors for oil well worksites (see References 28 and 29)?

Additional questions concern the use of rocks, rocky crags, outcroppings, cliffs, high walls, and similar items. What methods are available to fasten guy lines to rocks? What criteria are available for rock selection and fastening or attaching guy lines? How should such anchors be tested? Are there any other comments on the use of rocks as anchors?

There are general requirements for pull testing of anchors in the proposed standard. OSHA has received reports that testing of anchors should be performed at regular intervals and in accord with a schedule based upon exposure and use conditions of the anchors. What frequencies of testing of anchors is sufficient to ensure safety of workers? What kind of testing program and protocol should be used? What

criteria should be established for rejection of an anchor? Should pull test records be required on anchors?

Releasing boomers or load binders have been the cause of a number of accidents when wind load is added after rig-up. Since available alternatives exist, there appears to be no reason to continue the use of boomers. Phase-out time is included, along with an extension if a method is used temporarily to relieve tension before the boomer is released (see Reference 5 and 6).

In paragraph (e)(5) OSHA is proposing design and work practice requirements related to the drawworks. OSHA believes these requirements are necessary based on accident and fatality reports it has received (see References 5 and 6). Additionally, hazards related to the drawworks have long been recognized by the industry and have been addressed by trade association safety recommendations, which OSHA's proposal closely parallels (see References 1 and 2).

OSHA has records of numerous accidents involving tongs and slips which have resulted in fatalities and injuries. OSHA believes many of these injuries can be prevented by following safe work procedures proposed in paragraph (e)(6). These rules follow and parallel accepted industry practices (see References 1-3 and 5-8).

In paragraph (e)(7) OSHA is proposing design and work practice requirements to address hazardous conditions and practices associated with catheads and related lines, ropes and chains. OSHA has documented, in accident and fatality reports it has reviewed, that the cathead, catlines, ropes and chains were directly or indirectly responsible for numerous deaths and injuries to workers in this industry (see References 5 and 6).

In paragraph (e)(6) standards are proposed to address potential hazards such as the accidental release of a load associated with blocks, hooks, and elevators. OSHA has reviewed current industry recommendations, State standards, and other relevant sources and has determined that the proposed requirements will adequately address these hazards (see References 1, 2, 3, 5, 6, 7, and 9-16). OSHA has received reports of fatalities arising from running the travelling block into the crown block. To deal with this potentially fatal hazard, OSHA proposes to include a travel limiting device on all new rigs for drilling, servicing and special services. Due to economical and technical considerations, OSHA proposes that existing rigs be exempted from this provision. Provisions are included to

prevent sheaves and blocks from falling, and to ensure that elevators used to handle tubular goods are maintained so as to prevent failure. Provisions are also included with regard to inspection and use of hoisting lines.

Paragraph (e)(9) proposes that all drilling and servicing rigs be equipped with a weight indicator in operating condition. OSHA believes it is necessary for the driller to know the hook load which is suspended so the driller can avoid exceeding the rated capacity of the derrick or mast or the other components of the hoisting system. OSHA is also proposing that weight indicators installed six feet or more above the rig floor be secured by a separate safety line or chain. OSHA feels this is necessary to prevent injury to employees working below should the primary connection to the mast or derrick fail (see References 1, 5, and 6).

Well blowouts present a serious potential hazard to workers at a well site. Blowouts can result in fires and explosions which are capable of causing serious injuries and fatalities. Paragraph (e)(10) addresses the installation, testing, and specialized training of personnel required to control potential blowouts.

OSHA is requesting additional information on the need for and design of blowout prevention in the Agency Action section of this preamble. These questions are being raised to provide the Agency with sufficient information to promulgate a final rule which will provide adequate employee protection without causing undue financial burden to the industry.

Blowout prevention equipment is required at all well sites where it is known that blowouts can occur, and at all wells drilled into areas of unknown blowout potential. Provisions are included on inspection and testing of blowout prevention equipment. Additional provisions are included to ensure all equipment subject to well pressure will be capable of withstanding pressures encountered. Kelly cocks, or equivalents, are required and shall be readily operated by a lever or similar device to prevent back pressure at the kelly from rupturing the kelly hose or blowing back through the mud pipes (see References 1-3, 5, 6, and 13).

Paragraph (e)(11) proposes design and work practice requirements related to the kelly bushing, rotary table and other rotary equipment. In paragraph (e)(11), OSHA proposes that rotary equipment including the kelly bushing and the rotary table be guarded unless the construction and installation prevents the catching or snagging of employees or their clothes or ropes, lines, hoses,

chains and similar materials that could catch and then swing around on the rig floor striking equipment and employees. Accident and fatality reports reviewed by OSHA show that this equipment is a major factor contributing to injuries and fatalities in this industry (see References 5-7 and 21). OSHA believes that appropriate guarding of this equipment, or proper design and installation of this equipment supplemented with appropriate work practices, will control this hazard.

The first requirement in paragraph (e)(11) proposes to allow the rotary table to be used to spin out connections. This practice is widely used in the industry and OSHA feels that it has no adverse effect on employee safety. This paragraph further proposes to prohibit the use of the rotary table for breaking out connections except under emergency conditions. OSHA feels that the torque available when the rotary table is used to break out connections is not controlled and would easily produce enough force to break the tong snub lines, thereby allowing the tongs to spin freely. The spinning tongs have resulted in fatalities or severe injuries to employees standing nearby. OSHA prohibits this practice, except under emergency conditions, e.g., to break out frozen connections. OSHA believes this practice can be accomplished in relative safety if the other provisions of this paragraph are followed.

In the next requirement of paragraph (e)(11), OSHA is proposing that the rotary table be clear of all employees and unsecured materials before the operator engages the power. OSHA believes this requirement is necessary because if power is engaged prematurely, any employees standing on the rotary table would be thrown off and could receive critical injuries if thrown into other equipment or machinery. Additionally, loose materials could also be thrown off the rotary table causing injury to any employee close enough to be struck by them.

Paragraph (f) proposes additional requirements for well servicing and special services. Some of these operations, which involve special services that are covered in this paragraph, have been selected based on industry recommendations and other sources (see References 1, 2, 5, 6, and 7).

In paragraph (f)(1) requirements are proposed to lessen possible hazards present in certain well servicing operations. The first requirement concerns possible well pressures that may be encountered and requires that means to control these pressures shall be implemented before starting the

servicing operations. The requirements are additional and supplementary to the blowout prevention requirements proposed in paragraph (e)(10) of this section. Additionally, requirements are included to ensure that employees are not struck by the pumping machinery and shall be out the derrick or mast when unseating a subsurface pump.

Paragraph (f)(2) proposes specific equipment testing requirements and work practices for cementing operations. Due to the high pressures involved in these operations, OSHA feels these requirements are necessary to protect employees. OSHA believes that compliance with these requirements will lessen the chances of the rupture of high pressure lines or will at least minimize the injury potential to employees if the lines do rupture.

In paragraph (f)(3) the first set of proposed requirements are included to ensure wireline service units remain fixed in position once they are set up. Inadvertent or unexpected movement can occur with these units, creating immediate hazards to employees. Requirements are included to ensure that the wireline does not whip and injure employees when released from tension.

The second and third set of proposed requirements address the safe use of gin poles and rope falls. These requirements are being proposed to ensure that these hoisting systems will be so designed and maintained that they will be able to handle all anticipated loads, to prevent unwanted releases of loads and collapse of this hoisting equipment, damaged or worn parts may not be used.

The last set of proposed requirements in paragraph (f)(3) address a number of potentially hazardous operations which are involved in swabbing and perforating. The requirements proposed include control of flammable vapors or gases, limiting the possible ignition of any escaping gases, and taking additional precautions to protect employees engaged in swabbing.

Perforating has unique problems associated with the handling of explosives. Requirements proposed address these problems in accord with good practices in the industry (see References 1, 5, 6, and 7).

In paragraph (f)(4) OSHA is proposing design and work practice requirements for stripping and snubbing operations (see References 1, 2, 5, and 6).

The first requirement in paragraph (f)(4) proposes an emergency escape system for employees working atop hydroaulic snubbing equipment. Even though this equipment is usually smaller than most drilling and servicing equipment, OSHA believes that

employees working atop this equipment are exposed to the same hazards as derrickmen and must be provided the same protection.

The next requirement in paragraph (f)(4) proposes that snubbing towers be guyed or otherwise supported to prevent collapse or turnover. Although these towers are not as large as drilling or servicing masts or derricks, OSHA believes it is necessary to take precautions to prevent collapse or turnover.

The third requirement proposes that flow lines or bleed-off lines be located away from frequently occupied areas, such as the doghouse, or that they be secured to prevent whipping if the lines should rupture. OSHA feels that it is reasonable to anticipate that one of these lines could rupture due to high pressure, and that by taking the required precautions, the employer could lessen the chances of employee injury.

The fourth provision in paragraph (f)(4) proposes that two-way communication be provided between the snubbing operator and the pump operator. OSHA believes that communication is necessary to lessen the chance of equipment failure caused by the pressures on the system or other problems and to minimize the injury potential to employees.

In the next two requirements in paragraph (f)(4), OSHA is proposing that well pressure be monitored at all times during stripping and snubbing operations. OSHA believes this requirement is necessary to warn of impending blowouts and to allow control measures to be taken to prevent the blowout from occurring. Some of the control measures to be taken are that employees will be informed of the maximum working pressure limit of the equipment, and where this limit could be or actually is exceeded, the employer must provide blow down lines with remote control valves. OSHA believes that to conduct these operations safely, the employee must be aware of the limits of the equipment, and when these limits are exceeded, the employee must vacate the wellhead area, and the employee must be able to release excess pressure from a safe distance.

The last requirement in paragraph (f)(4) proposes to prohibit the use of gasoline engines in snubbing operations. OSHA believes that gasoline engines would be potential ignition sources, igniting flammable gases or vapors generated or released by these operations.

Paragraph (f)(5) proposes to address the hazards related to drill stem testing which present an especially severe set of problems. When conducting a drill

stem test, conditions may exist in a well which could easily lead to a fire or blowout. OSHA is requiring all sources of ignition (including artificial lighting) be strictly controlled. In addition, OSHA would prefer that drill stem testing be conducted during daylight hours to eliminate the need for artificial lighting. When conditions require the use of artificial lighting, light levels shall be sufficient to allow employees to safely conduct the test. The remaining provisions are to control the hazards of possible blowouts and allow well control to be established quickly and effectively (see References 1 and 15).

In paragraph (f)(6) OSHA is proposing design and work practice requirements for acidizing, fracturing and hot oil operations (see References 1, 2, 5, and 6).

The first two requirements of paragraph (f)(6) propose that all lines connected from the pumping equipment to the well have a check valve installed as close to the wellhead as possible. Additionally, when a multi-pump manifold is used, a check valve needs to be placed in each discharge line as near to the manifold as possible. OSHA believes this is necessary in order to prevent backflow if the well is under pressure or develops pressure during the operation. OSHA proposes that an inspection be made before beginning pump operations to ensure that discharge line connections are assembled properly and that all valves in the discharge lines are opened. Restricted flow of liquid under pressure could cause the lines to rupture and endanger employees in the area.

The next provision of paragraph (f)(6) proposes all blending equipment used in these operations be electrically grounded, and all equipment unloading proppants into the hopper be bonded to the blending equipment. OSHA believes this precaution is necessary to prevent the buildup of static electricity which could arc and ignite flammable or combustible vapors or liquid leaks.

In the fourth requirement of paragraph (f)(6) OSHA is proposing that hoses which develop a leak while being used to pump flammable or combustible liquids, under pressure, be covered to prevent the liquid from spraying into the air. Additionally, OSHA is proposing that all leaking hoses be removed from service as soon as practicable. OSHA believes that hoses used to pump flammable or combustible liquids under pressure should not leak since this would pose a fire hazard. OSHA feels that covering hoses which develop leaks during the operation will significantly reduce the chances of a fire by limiting

the atomization of an enriched flammable mixture in the air around the leak, and thus will greatly reduce the build up of a flammable vapor cloud which could be ignited.

Paragraph (f)(6) proposes in the fifth requirement that pump discharge lines be tested before treatment begins to the maximum expected treating pressure plus 1000 psi. OSHA believes that this pre-treatment testing is a necessary precaution to ensure the hose is safe for its intended use. This is especially important when using acids, flammables, or other hazardous materials.

Paragraph (f)(6) proposes in the sixth provision that all ignition sources be controlled when pumping flammable and combustible liquids. OSHA believes that leaks and spills are an ever present hazard during these operations and control of ignition sources is necessary.

The last provision of paragraph (f)(6) proposes that spilled oil or acid be disposed of promptly. Additionally, this paragraph proposes to require that employees performing this duty wear rubberized protective clothing or other clothing which is resistant to oil and/or acid penetration. OSHA believes that the prompt clean up of spills is necessary to minimize fire and/or slipping hazards. Additionally, employees required to perform this task must be protected from exposure to the hazards related to the acid or oil in use.

Paragraph (f)(7) proposes requirements for freezing, valve drilling and pipe tapping operations. These proposed requirements are based on current industry recommendations (see Reference 1) and address hazards related to the high pressures involved in these operations. Testing procedures are prescribed to assure that the equipment is capable of operating at test pressures.

Paragraph (f)(8) proposes the employer review the history of a well before starting fishing operations. Additionally, OSHA is proposing that when such review shows that the well has the potential of flowing, or could contain high pressure or hydrogen sulfide, the employer must take steps to control hazards (see References 1, 5, 6, and 7). OSHA believes such reviews a necessary part of preplanning a fishing operation and will permit employers to determine what steps or equipment are necessary to protect the employees.

In paragraph (f)(9) OSHA is proposing design and work practice requirements for gas, air or mist drilling. OSHA has reviewed current industry practices and recommendations (see Reference 1) and State standards (see Reference 15) which addressed the hazards found in these operations and has based these

proposed requirements on those sources. Phase in dates of July 1, 1984, are prescribed for pressure relief valves, engaging shut-off valves, pressure gauges, check valves and other equipment to allow for an orderly conversion or upgrading of the employer's equipment. Ignition source control and other work procedures and equipment used in these operations are addressed (see Reference 1, 5, and 6).

OSHA has received reports of serious injuries and fatalities in air drilling operations due to the misapplication of high pressure air. What restrictions are appropriate to prevent misuse of potentially hazardous high pressure air? How may the available high pressure air be used for purposes other than as the drilling fluid on and about rigs?

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## V. Preliminary Regulatory Impact Assessment and Regulatory Flexibility Analysis and Environmental Assessment

### Introduction

Executive Order 12291 (46 FR 13197, February 19, 1981) requires that a regulatory analysis be conducted for any rule having major economic consequences on the national economy, individual industries, geographical regions, or levels of government. The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) similarly requires the Occupational Safety and Health Administration (OSHA) to consider the impact of the proposed regulation on small entities.

Consistent with these requirements, OSHA has prepared a Preliminary Regulatory Impact and Regulatory Flexibility Analysis for the proposed oil and gas well drilling and servicing standard. This standard would supplement existing OSHA standards in 29 CFR Part 1910 that either fail to address or inadequately address the unique hazards found in these operations. This analysis describes the industries affected by the standard, the non-regulatory environment and alternative provisions considered, the cost of compliance with the proposed standard, the technological feasibility of the proposed provisions, and some of the potential benefits that will accrue to employees who are subject to the hazards unique to oil and gas well drilling and servicing.

The Secretary has determined that this action would not be major as defined by Section 1(b) of Executive Order 12291. The Secretary also certifies that this action would not have a significant impact on a substantial number of small entities as defined by the Regulatory Flexibility Act.

The proposed standard would cover an estimated 1,000 drilling, 800 well servicing, and 750 special services

companies.\* The oil and gas well drilling, servicing, and special services industries are primarily engaged in producing and recovering oil and gas. Drilling firms own and operate rotary drilling rigs and are contracted to drill oil and gas wells. Well servicing contractors perform activities related to completion and maintenance of new wells or workover of existing wells using workover rigs. Well servicing includes special services on new and old wells including cementing, acidizing, fracturing, etc.

### Exposure Profile

OSHA estimates that the proposed standard would cover approximately 95,000 employees—47,000 in drilling, and 48,000 in servicing and special services. These numbers reflect the recent declines in drilling and servicing through March/April 1983. The number of workers covered in servicing and special services by this proposal excludes approximately 40 percent of the workers in this industry covered by Part 1910 General Industry Standards or by Part 1926 OSHA Construction Standards. These excluded employees perform work not involved in "downhole" servicing, for example road construction.

### Overview of Expected Effectiveness of Proposed Standard

The current regulatory environment for oil and gas drilling and servicing includes state regulation and OSHA General Industry Standards. Nonregulatory alternatives to mitigate hazards in the drilling and servicing industries include worker's compensation and tort liability. Both the regulatory and nonregulatory alternatives will result in an estimated baseline risk of 15,650-17,080 accidents and 48-52 fatalities in drilling, and 24,400-26,635 accidents and 94-103 fatalities in servicing, for 1984, the first year the rule is anticipated to be in effect. This is based on adjusted BLS estimates of accidents per 100 workers for 1981. In 1981 oil field accidents accounted for 259 fatalities. Further, the accidents represented 328,100 lost workdays for the drilling industry and 414,200 lost workdays for the servicing industry, or 198.1 lost workdays per 100 full-time workers for both industries.

The estimated average monetizable cost of an accident is \$9,886 in the drilling industry and \$12,357 for servicing and special services industries. The average cost of an accident in the drilling industry is estimated to be 20

percent lower than for the servicing industries, because accidents in drilling are generally less severe.

A major cost of these accidents is the foregone production or value of goods and services that would have been provided by the worker if he or she had not been incapacitated by the injury. This reduction in output is a cost incurred by society in general. In addition, society incurs the cost of medical treatment for these accidents. Because of the severity of these accidents, the medical treatment required is often complex and prolonged.

The total social cost of foregone production and medical treatment associated with injuries and fatalities in these industries is expected to be between \$456 million and \$498 million in 1984 (fatalities and totally permanent disabilities account for 18 percent of total accident costs). OSHA estimates that the proposed standard would significantly reduce the injury and fatality incidence rate and save between \$150 and \$164 million in 1984, which would be the first full year after implementation of the standard. The present value of this reduction in social cost for 1984-1993 is expected to be between \$1.02 billion and \$1.32 billion, using a 10-percent discount rate. This period represents the first 10 years that the standard will be in effect. The reason for the range in the estimated number of accidents and the monetized economic benefits reflects the use of two alternative growth projections—one assuming zero growth and one an annual growth of 4.5 percent during 1983-1993.

Reduction in these social costs represents only some of the benefits that would be forthcoming when the proposed standard is implemented. Many of the impacts of the accidents in these industries such as the pain and suffering of the affected workers and their families are not quantifiable. Given the severity of accidents, the nonquantified social costs are expected to be substantial. Hence, the figures above underestimate the true social costs.

### Overview of Compliance Costs

Industry conditions and practices in March/April 1983 are used as the baseline to measure the cost of complying with the proposed standard. The unit cost estimates per rig (or special service unit) are combined with the number of facilities and employees affected by the proposed standard to yield the total compliance cost.

\* A few provisions will impact on oil producing firms.

The estimated annual cost of the proposed standard for the oil field industries is \$22.3–24.3 million. Equipment cost would represent 41.0 percent of total annual costs. Work practice modifications and training would represent 47.8 percent and 11.1 percent of the total annual cost, respectively. The present value of the total cost stream from 1984–1993 discounted at 10-percent annually would be between \$151 million and \$195 million. Again, these ranges reflect the use of the two growth assumptions mentioned previously.

Blowout prevention is one of the major objectives of the proposed OSHA standard. Blowouts cause severe occupational injury as well as property and environmental damage. The requirement for blowout prevention equipment would be the largest cost component of the proposal and would account for 11 percent of the total estimated compliance costs. In another section of this preamble, OSHA requests additional information on the frequency and severity of blowouts and hence the need for regulatory action. In addition, OSHA seeks information on whether market incentives (such as reduced cost of workers' compensation and insurance as well as reduced tort liabilities) prompt employers to provide adequate protection against the hazards of blowouts in the absence of regulation. The proposed OSHA standard also would require specific handling procedures for hydrogen sulfide, a poisonous gas found in some oil and gas formations. This requirement would account for 10 percent of the total compliance cost.

#### *Industry Impacts*

Compliance costs for the oil field industries are expected to be relatively small on a per firm or per rig basis. It must also be noted that compliance costs are overestimated because accident prevention should also increase productivity by reducing the costs of downtime, administration costs, insurance premiums, and environmental damage.

Compliance costs on a per rig basis are \$2,639 for drilling and \$3,054 for servicing. Compliance costs as a percentage of total revenue for individual firms would be 0.1 percent for the drilling industry and 0.8 percent for the servicing sector. For special services, the cost would vary from 0.03 to 0.34 percent, depending on the type of unit.

These industries, however, are currently in a downturn as a result of the decline in wellhead revenues. Small drilling firms are in a particularly poor

financial condition as capacity for the industry is below 50 percent. Several small firms have ceased operations and more may likely follow.

This contraction of these industries, however, is due to the current reduced demand for oil and gas and the resultant decline in fuel prices. It is not expected that the proposed OSHA standard would have a perceptible impact on the rate of firms leaving the oil field business.

#### *Technological Feasibility of the Proposed Standard*

OSHA is required to assess the technological feasibility of new regulations prior to promulgation. The safety equipment and work practices contained in the proposed OSHA standard have been demonstrated to be technologically feasible. A significant portion of the firms in the industry are currently implementing the measure or are clearly capable of doing so. This conclusion is based on a comparison of current industry practices compared with the requirements of the proposed standard.

In summary, the high levels of compliance observed in site visits and confirmed in discussions with industry experts indicate that the vast majority of requirements in the proposed standard have already been implemented by the industry. These requirements are clearly technologically feasible. Even those subparagraphs in the proposed standard that are generally not followed are capable of being complied with and are therefore technologically feasible.

#### *Regulatory Flexibility Analysis*

Pursuant to the Regulatory Flexibility Act of 1980 (Pub. L. 96–353, 94 Stat. 1164 (U.S.C. 601 *et seq.*)), OSHA does not believe that the regulation would have an adverse impact upon a significant number of small entities.

As the analysis indicates, the current decline in demand for oil and gas in combination with declining fuel prices has sharply cut revenues and profits of both drilling and servicing companies, and has an adverse impact upon the smaller firms in these industries. A number of small companies are either barely profitable or are incurring losses. In such a situation, any added cost would be burdensome. Yet, the problem for these small firms is not the added cost of the OSHA proposal, it is the state of the oil and gas market. Thus, the financial problems will persist irrespective of OSHA as long as the current slump in oil drilling and servicing continues. It appears that these industries overexpanded during the late 1970's and are likely to shrink

somewhat in the near future. Much of this shrinkage is likely to occur through the exit of the smaller companies. While cost attributable to this proposal may hasten their decline somewhat, such costs will not be the source of the decline.

OSHA is aware of the sensitivity of this issue, however, and requests public comment on the extent of small business burdens which may result from this proposal and other regulatory alternatives.

#### *Other Impacts*

OSHA has reviewed the likely effects of this proposal on productivity and market concentration in the drilling and servicing industries, and has concluded that the proposal will not significantly affect these factors. OSHA also has reviewed the macroeconomic impact of the proposal on employment and inflation and has determined that these impacts also will not be significant.

#### *Environmental Impact*

This proposal has been reviewed in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4231 *et seq.*), the Guidelines of the Council on Environmental Quality (CEQ) (40 CFR Part 1500), and OSHA's DOL NEPA Procedures (29 CFR Part 11). As a result of this review, the Assistant Secretary has determined that the proposed rule will have no significant environmental impact. Although safety standards rarely impact on air, water or soil quality, plant or animal life, the use of land or other aspects of the environment, it is appropriate to examine whether the proposed provisions of the OSHA oil and gas well drilling and servicing standard (29 CFR 1910.270) will alter the environment external to the workplace.

Both oil and gas well drilling and servicing are activities that can have potential environmental impacts, such as those resulting from blowouts. These types of environmental accidents come under the jurisdiction of the Environmental Protection Agency (EPA) and are covered by the Clean Air Act of 1977 (33 U.S.C. 1251 *et seq.*).

The requirements of the proposed standard concern mainly work practices and procedures, emergency planning, education and training, fire prevention and protection, equipment use and maintenance, and medical treatment and first-aid.

One provision of the proposal—the use and maintenance of blowout prevention equipment—may have some beneficial impact on the environment.

This equipment is required when well surface pressures are encountered that present blowout hazards, when such pressures are anticipated at the well site, or when drilling in areas where there is no prior knowledge of the kinds of well surface pressures to be encountered. This provision may prevent some environmental damage, since it is intended to prevent blowouts. Most other provisions of the standard, however, appear unlikely to have any significant environmental consequences, either positive or negative.

#### VI. Recordkeeping

The proposed standard contains a "collection of information" (recordkeeping) requirements pertaining to hydrogen sulfide monitoring procedures (§ 1910.270(d)(8)). In accordance with 5 CFR Part 1320 (Controlling Paperwork Burdens on the Public), OSHA has submitted the proposed recordkeeping requirement to the Office of Management and Budget (OMB) for review under Section 350(h) of the Paperwork Reduction Act. Comments regarding the proposed recordkeeping requirements may be directed to the Office of Information and Regulatory Affairs, OMB, Attention: Desk Officer for the Occupational Safety and Health Administration, Washington D.C. 20503.

#### VII. Public Participation

Interested persons are invited to submit written data, views, and arguments with respect to this proposal. These comments must be postmarked on or before March 5, 1984 and submitted in quadruplicate to the Docket Officer, Docket S-360, Room S6212, U.S. Department of Labor, Washington, D.C. 20210. Written submissions must clearly identify the specific provisions of the proposal which are addressed and the position taken with respect to each issue.

The data, views and arguments that are submitted will be available for public inspection and copying at the above address. All timely submissions received will be made a part of the record of this proceeding. The preliminary regulatory assessment and the exhibits cited in this document will be available for public inspection and copying at the above address. OSHA invites comment concerning the conclusions reached in the economic impact assessment.

Additionally, interested persons may file objections to the proposal and request an informal hearing with respect thereto. The objections and hearing requests should be filed in accordance with the following conditions:

1. The objections must include the name and address of the objector;
2. The objections must be postmarked on or before March 5, 1984;
3. The objections must specify with particularity the provisions of the proposed rule to which objection is taken and must state the grounds therefor;
4. Each objection must be separately stated and numbered; and
5. The objections must be accompanied by a detailed summary of the evidence proposed to be adduced at the requested hearing.

#### VIII. State Plan Standards

The 24 States with their own OSHA-approved occupational safety and health plans must adopt a comparable standard within six months of the publication date of the final rule. These states are: Alaska, Arizona, California, Connecticut (for state and local government employees only), Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington, Wyoming. Until such time as a State standard is promulgated, Federal OSHA will provide interim enforcement assistance, as appropriate, in these States.

#### IX. Authority

This document was prepared under the direction of Thorne G. Auchter, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue, NW., Washington, D.C. 20210.

Accordingly, pursuant to sections 6(b) and 8(c) of the Occupational Safety and Health Act of 1970 (84 Stat. 1593, 1599; U.S.C. 655, 657, Secretary of Labor's Order No. 9-83 (43 FR 35736)), and 29 CFR Part 1911, it is proposed to add a new § 1910.270 to 29 CFR Part 1910 as set forth below.

Signed at Washington, D.C. this 22nd day of December 1983.

Thorne G. Auchter,

Assistant Secretary of Labor.

#### List of Subjects in 29 CFR Part 1910

Occupational safety and health, Safety, Oil and gas well, Drilling, Well servicing, Chemicals, Electric power, Explosives, Fire prevention, Flammable materials, Footwear, Gases, Hazardous materials, Ladders and scaffolds, Machinery, Protective equipment, Respiratory protection, Signs and symbols, Tools, Welding.

#### PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS

Part 1910 of Title 29 of the Code of Federal Regulations is proposed to be amended by adding a new § 1910.270 and Appendices A, B, C, and D to read as follows:

##### § 1910.270 Oil and gas well drilling and servicing.

(a) *Scope and application.* (1) *Scope.* This section contains requirements for drilling, servicing and related operations performed on, or in support of, potential and actual oil and gas wells, including injection wells and water supply wells. The standard addresses hazards associated with assembling and disassembling rigs, rotary drilling, well servicing, cementing, drill stem testing, well completion, wireline services, and acidizing. In addition to the provisions of this section, all other relevant provisions in Part 1910 apply to oil and gas well drilling and servicing. This section does not apply to site preparation, which includes grading, road construction, excavating, and pit construction, since these operations are covered by Part 1926, Construction Safety and Health Standards, of this Title.

(2) *Application.* The requirements of this section apply to all rigs engaged in these operations, whether they are land-based rigs or over-the-water rigs except to the extent that 29 U.S.C. 653(b)(1) prohibits the application of the OSH Act. Exploratory wells, development wells, injection wells and water supply wells drilled in support of oil and gas recovery operations are also covered by this section. The requirements of this section do not apply to cable tool drilling, drilling for seismic tests, subsoil structural investigations, drilling of wells for sulfur and other minerals, nor to water wells drilled for purposes other than to support the recovery of gas or oil.

##### (b) *Definitions.*

*Acidizing* means to treat oil-bearing limestone or other formations with acid under pressure to increase production.

*Air drilling* means a method of rotary drilling using compressed air as its circulating medium.

*Anchor* means a device that is used to secure, fasten, or stabilize.

*Annular blowout preventer* means a large valve, usually installed above the ram preventers, that forms a seal in the annular space between the pipe and wellbore.

*Bleed-off line* means the pipe used to release pressure from a well or pressurized equipment.

**Blind ram** means that part of the blowout preventer which serves as the closing element when no pipe is present in the hole. Its ends do not fit around the drill pipe, but seal against each other and shut off the space below completely.

**Blooney line** means the discharge pipe from a well being drilled by air, gas or mist drilling. The blooney line is used to conduct the air, gas or mist used for circulation away from the rig to reduce the fire hazard as well as to transport the cuttings a suitable distance from the well.

**Blowdown line** means the surface pipe which carries oil, gas or other fluid from a well to processing equipment or storage.

**Blowout** means an uncontrolled flow of gas, oil or other well fluids into the atmosphere.

**Blowout preventer (BOP)** means the equipment installed immediately above the casing/conductor to prevent the escape of pressure into the atmosphere.

**Boomer (load binder)** means a lever actuated device used to tighten chains on a load of pipe or other equipment to make it secure, or to tighten backstays or anchors on derricks and masts.

**Block valve** means a shut-off valve.

**Borehole** means the wellbore; the hole made by drilling or boring.

**Brake** means a device for arresting the motion of a mechanism, usually by means of friction, as in the drawworks brake.

**Break out** means to unscrew one section of pipe from another section.

**Casing** means the pipe used to line a well to prevent caving in during drilling and to provide a means of extracting petroleum if the well is productive.

**Casinghead** means a steel fitting that connects to the first string of casing and provides a housing for slips and packing assemblies which are used to suspend the intermediate strings of casing.

**Cathead** means a spool-shaped extension of the drawworks shaft used to lift heavy equipment and to make up or break out drill pipe.

**Catwalk** means the ramp at the side of the drilling rig where pipe is laid out to be hoisted to the derrick floor by the catline. The term can also mean an elevated walkway.

**Cellar** means a pit in the ground to provide additional height for equipment between the rig floor and the wellhead.

**Cementing** means the application of a liquid slurry of cement and water to various parts inside or outside the casing.

**Change house** means a small building used by the crew members to change clothes.

**Check valve** means a valve that permits flow in one direction only.

**Choke line** means an extension of pipe from the blowout preventer used to direct well fluid from the annulus to the choke manifold.

**Christmas tree** means the control valves, pressure gauges, and chokes assembled at the top of a well to control the flow of oil, gas or other fluid after the well has been drilled and completed.

**Come-along** means a manually-operated device used to tighten guy wires or move heavy loads.

**Confined space** means an enclosed working space (including, but not limited to, tanks, vats, vessels, and boilers) with limited or restricted ingress and egress and possessing known or potential hazards of:

- (1) Insufficient oxygen to support life;
- (2) Flammable, highly reactive or unstable gases, vapors, fumes or solids;
- (3) Toxic gases, vapors, fumes or solids immediately dangerous to life; or
- (4) Presence of energy sources (e.g., thermal, chemical, mechanical, electrical) where the confinement factor increases the likelihood of contact between the energy source and employees.

Pits, cellars and other open-topped spaces are not considered confined spaces whenever:

- (1) Their depth is four (4) feet or less; or
- (2) Their depth is less than one-half the smallest dimension of the top opening.

**Crew member** means a driller/operator, derrickman and floorhands, helpers, etc., who operate or work on a rig.

**Crown block** means an assembly of sheaves or pulleys mounted on beams at the top of the derrick or mast over which a hoisting line is reeved.

**Deadline** means the line from the crown block sheave to an anchor.

**Derrick** means a large load-bearing structure that supports the crown block. (Also see mast.)

**Derrickman's working platform** (See monkeyboard, stabbing board, tubing board, rod basket.)

**Detector tube** means a sampling device used to detect atmospheric contaminants and provide an approximation of the concentration of the contaminant.

**Development well** means a well drilled in a proven field to complete a pattern of production.

**Doghhouse** means a small enclosure on the rig floor used as an office, storehouse or changeroom.

**Drawworks** means the hoisting mechanism on a drilling, well servicing

or workover rig. It is essentially a large winch that spools off or takes in the hoisting line and thus raises or lowers the drill stem and bit, tubing or sucker rods.

**Drill collar** means a heavy thick-walled steel tube placed above the drill bit in order to add weight.

**Drill pipe** means the seamless pipe used to rotate the drill and circulate drilling fluids.

**Drill stem** means all members in the assembly used for drilling by the rotary method from the swivel to the bit, including the kelly, drill pipe and tool joints, drill collars, stabilizers, and drill bit.

**Drill stem test** means a method of gathering data on the potential productivity of a formation by permitting the flow of petroleum products back through the drill pipe.

**Drill string** means the column or string of drill pipe including attached tool joints.

**Driller's/operator's console** means a cabinet on the rig floor which contains the controls that the driller/operator uses to manipulate the various functions of the rig.

**Drilling** means the operation of boring a hole in the earth, deepening a hole, or use of similar processes to clean or modify an existing well.

**Drilling fluid** means any fluid circulated in a well which is being drilled or worked over.

**Drilling rig** means the derrick, drawworks and all other surface equipment of a drilling unit.

**Drum** means a cylinder around which wire rope is wound in the drawworks.

**Elevator** means a set of clamps or latches that grip a stand, or column of casing, tubing or drill pipe so that the stand can be raised or lowered into the hole.

**Exploratory well** means a well drilled in an area where no oil or gas production exists. It is also known as a wildcat well.

**Fastline** means the end of the drilling line that is affixed to the drum or reel of the drawworks.

**Fingerboard** means a rack that supports the tops of the stands of pipe being stacked in the derrick or mast. It has several steel finger-like projections that form a series of slots into which the derrickman can set a stand of drill pipe or tubing as it is pulled out of the hole.

**Fish** means an object left in the wellbore.

**Fishing** means the act of retrieving a fish from the wellbore.

**Flow line** means the surface pipe which carries drilling fluid from surface tanks or other storage.

**Fracturing** means a method of stimulation in which a fluid is pumped into the well under high pressure to create or enlarge cracks in a formation.

**Frozen plug** means an intentional blockage formed by the use of a refrigerant or cryogen to solidify liquid in the pipe.

**Gas drilling** means a method of rotary drilling using compressed gas as its circulating fluid.

**Gin pole** means hoisting equipment and a pole or arrangement of poles for lifting heavy machinery.

**Heacache post** means a device used to prevent broken or whipping lines from striking the driller.

**Hoist** means an arrangement of pulleys and wire rope or chain used for lifting heavy objects; a winch or similar device; the drawworks.

**Hoisting equipment** means any powered arrangement of pulleys and wire rope or chain used to lift equipment.

**Hot oil operations** means the treatment of a producing well with heated oil to melt accumulated paraffin in the tubing and annulus.

**Immediately dangerous to life and health (IDLH)** means conditions that pose an immediate threat to life, or conditions which are likely to result in immediate, permanent, adverse health effects.

**Kelly** means the hollow three-, four-, or six-sided steel members suspended from the swivel which goes through the rotary table and connects to the top-most joint of drill pipe.

**Kelly bushing** means a special device fitted to the rotary bushing that transmits torque to the kelly and simultaneously permits vertical movement of the kelly to make hole.

**Kelly cock** means a valve installed below the swivel and either above or below the kelly to keep pressure off the swivel and rotary hose.

**Kelly hose** means a reinforced, flexible tube on a rotary drilling rig that conducts the drilling fluid from the standpipe to the swivel; also called the mud hose or rotary hose.

**Kick** means an entry of water, gas, oil, or other formation fluid into the wellbore, occurring because formation pressures are greater than the pressure exerted by the column of drilling fluid.

**Kill** means (a) In drilling—to prevent a threatened blowout by taking suitable preventive measures (e.g., to shut in the well with the blowout preventers, circulate the kick out, and increase the weight of the drilling fluid); (b) In production—to stop a well from producing oil and gas so that reconditioning of the well can proceed.

**Kill line** means a high pressure line that connects the mud pump and the well annulus through which heavy drilling fluid can be pumped into the well to control a threatened blowout.

**Lubricator** means a special length of casing or tubing placed temporarily above a valve on top of the casing or tubing head used to run tools or substances into a producing well without having to kill it.

**Manifold** means an accessory system of piping that divides a flow, combines several flows, or reroutes a flow.

**Mast** means a portable derrick capable of being erected as a unit, as distinguished from a standard derrick, which cannot be raised to a working position as a unit.

**Mist drilling** means a drilling technique that uses air or gas and a foaming agent as a circulating medium.

**Monkeyboard** means the platform on which derrickmen work. (Also called tubing board and rod basket.)

**Mousehole** means an opening through the rig floor used to temporarily store a length of drilling pipe for later connection to the drill string.

**Mud** means the liquid circulated through the wellbore during rotary drilling and workover operations.

**Mud box** means a device wrapped around pipe connections to deflect fluid released when a joint or stand of pipe containing liquid is unscrewed.

**Mud settling tank** means the mud pit into which mud flows and in which heavy solids are allowed to settle out.

**Oil saver** means a device used to prevent leakage and waste of gas, oil or water around a wireline.

**Perforate** means to pierce the casing wall and cement to provide holes through which formation fluids may enter or to provide holes in the casing so that materials may be introduced into the annulus between the casing and the wall of the borehole.

**Personnel basket** means a device having waist high solid or mesh sides and an opening for access used to position personnel.

**Pit** means a storage container used to hold liquids that are circulated through the drill string.

**Platform** means any surface from which work may be performed.

**Pole mast** means a portable mast constructed of tubular members.

**Power tongs** mean pneumatically or hydraulically operated tools that serve to spin the pipe up tight, and in some instances to apply the final makeup torque.

**Proppant** means a granular substance carried in suspension by the fracturing fluid that serves to keep the cracks open

when the fracturing fluid is withdrawn after a fracture treatment.

**Pull tubing** means the removal of tubing from a well.

**Pulling a string** means removing the entire length of casing, tubing or drill pipe from the hole.

**Pump** means a device to increase the pressure on a fluid, or to raise a fluid to a higher level.

**Racking platform** means a small platform with fingerlike steel projections attached to the side of the mast on a well servicing unit.

**Ram** means the closing and sealing component on a blowout preventer.

**Rathole** means a hole in the rig floor 30 to 35 feet deep, lined with casing that projects above the floor, into which the kelly and swivel are placed when the kelly and swivel are not in the drill string.

**Reeve** means to pass (as the end of a rope) through a hole or opening in a block or similar device, or over a sheave.

**Rig** means the derrick or mast, drawworks, and attendant surface equipment of a drilling, workover or well servicing unit.

**Rig up operations** mean the operations necessary to prepare a rig for drilling, servicing, workover and related activities.

**Rod basket** means the derrickman's work platform on service and workover rigs, in which rods are racked (see monkeyboard).

**Rotary drilling** means a drilling method in which a hole is drilled by a rotating bit to which a downward force is applied.

**Rotating head** means a sealing device usually installed above the main BOP used to close off the annular space around the kelly when drilling with pressure at the surface.

**Round trip** means the operation of hoisting the drill stem or other tubular material from the wellbore, and returning these to the wellbore.

**Shale shaker** means a vibrating sieve used to remove cuttings from the circulating fluid.

**Sheave** means a grooved pulley.

**Skidding** means to move a rig with a standard derrick short distances with little or no dismantling of equipment.

**Slips** mean wedge-shaped pieces of metal with teeth or other gripping elements that are used to prevent pipe from slipping down into the hole or to hold pipe in place.

**Snubbing** means to put pipe or tools into a high-pressure well that has not been killed (i.e., to run pipe or tools into the well against pressure).

**Snub line** means the tong safety line.



**Stabbing board** means a temporary elevated platform, erected in a derrick or mast.

**Standpipe** means a vertical pipe rising along the side of the derrick or mast, which joins the mud or other fluid pump to the rotary hose and through which mud or other drilling fluid is pumped.

**Stripping** means to pull rods and tubing from a well at the same time.

**Stripper rubber** means: (1) A rubber disk surrounding drill pipe or tubing that removes mud as the pipe is brought out of the hole; (2) the pressure sealing element of a stripper blowout preventer.

**Substructure** means the foundation on which the derrick or mast sit, containing space for storage, well control equipment and in some instances, the engine.

**Subsurface pump** means a submersible pump placed below the level of fluid in a well.

**Swab** means a rubber-faced hollow cylinder mounted on a hollow mandrel used to remove fluids from a well when pressure is sufficient to support flow.

**Swabbing** means operation of a swab on a wireline to lift fluid from the wellbore to determine if a well will flow, or to empty the hole prior to perforating.

**Swivel** means a rotary tool that is hung from the rotary hook and traveling block to suspend and permit free rotation of the drill stem.

**Tongs** means the large wrenches used for turning when making up or breaking out drill pipe, casing, tubing, or other pipe; variously called casing tongs, rotary tongs, etc., according to the specific use.

**Tool joint** means a heavy coupling element for drill pipe made of special alloy steel. Tool joints have coarse, tapered threads and seating shoulders designed to sustain the weight of the drill stem, withstand the strain of frequent coupling and uncoupling, and provide a leakproof seal. The male section of the joint, or the pin, is attached to one end of a length of drill pipe, and the female section, or box, is attached to the other end. The tool joint may be welded to the end of the pipe or screwed on or both. A hard metal facing is often applied in a band around the outside of the tool joint to enable it to resist abrasion from the walls of the borehole.

**Tour** (pronounced "tower") means the work period of a crew.

**Traveling block** means an arrangement of pulleys, or sheaves, through which drilling line is reeved and that moves up and down in the derrick or mast.

**Tubing** means small diameter pipe that is run into a well to serve as a

conduit for the passage of oil and gas to the surface.

**Tubing board** means the derrickman's work platform during the time the crew is pulling or running tubing into the well.

**Vee-door** means an opening at floor level in a side of a derrick or mast opposite the drawworks, used to bring pipe and casing from the pipe rack.

**Weight indicator** means an instrument that shows the weight suspended from the hooks.

**Well completion** means the activities and methods necessary to prepare a well for the production of oil and gas; and method by which a flow line for hydrocarbons is established between the reservoir and the surface.

**Wellhead** means the equipment used to maintain surface control of a well, and includes the casinghead, tubing head and christmas tree.

**Well servicing** means the remedial or maintenance work performed on an oil or gas well to improve or maintain the production from a formation already producing.

**Well servicing rig** means a portable rig consisting of a hoist, engine and a self-erecting mast. A workover rig is basically the same as a well servicing rig except it has a substructure, well rotary, mud pumps and pits and other equipment to permit handling and working a drill string.

**Wireline** means a metal cable usually small in diameter that is used for lowering special tools (such as logging devices, perforating guns, etc.) into the well.

**Wireline services** means those operations which can be accomplished by the use of tools or equipment which can be set, pulled, or operated on a wireline.

**Wire rope** means a cable composed of steel wires twisted around a central core of hemp or other fiber to create a rope of great strength and considerable flexibility.

(c) **General requirements for all operations.** (1) **Medical and first aid.** In addition to the requirements of Subpart K of this Part, and prior to commencement of work at the well site:

(i) At least one person who is trained and currently certified in first aid and basic rescue techniques shall be available at the well site to render first aid any time work is in progress.

(ii) An instrument of communication (telephone, two-way radio, etc.) shall be available at or near the well site and in working condition for use in establishing contact for obtaining medical assistance when work is in progress.

(iii) The employer shall arrange for transportation of persons needing prompt medical attention. The vehicle

used for such transportation shall be of such size to accommodate a person on a stretcher and an accompanying person; designed or equipped to protect the injured worker and the accompanying person from the weather elements and dirt or dust and allow verbal communication between the operator of the vehicle and the injured worker or the accompanying person. If helicopters are to be used, then the requirement for verbal communication does not apply.

(iv) Either of two alternative medical contingency plans shall be developed and communicated to affected employees:

(a) A plan shall be developed and all rig personnel trained in operations of the plan. No employee shall be allowed to work on or about the rig until trained in the plan operation. The plan development and preparation and training of the rig personnel shall be certified in writing by the employer. Employees shall be retrained at least once each year on the medical contingency plan; or

(b) The employer shall develop a written medical contingency plan prescribing the procedures for obtaining prompt medical assistance for injured employees who require more than first aid treatment. This contingency plan shall prescribe the procedures to be used for establishing communications with the source of medical assistance, including the location of the instrument used for communication (telephone, two-way radio) and prescribe procedures on the arrangements made for the transportation of injured employees. All employees at the well site shall be informed of the procedures of this contingency plan. The contingency plan, or that portion of the contingency plan to be carried out by onsite employees, shall be available at the worksite for inspection by the Assistant Secretary or his designee.

(2) **Emergency planning.** (i) An emergency action plan shall be developed and implemented for all rig operations. This plan shall prescribe the emergency procedures which are to be followed in the event of a kick, fire, hydrogen sulfide release or other well emergencies which may be encountered. This plan shall meet the requirements of § 1910.38(a) except that a written plan is not required if the employer:

(a) Prepares an emergency action plan and provides all rig crew members with details of the plan,

(b) Permits no employee to work on or about the rig until that employee has been trained in the emergency action plan,

(c) Certifies (in writing) that steps (a) and (b) have been completed.

(ii) All employees shall be given instructions on the emergency procedures discussed in this emergency action plan before starting on the job, and again at no greater interval than once each year thereafter.

(3) *Employee training and education.*

(i) Before new employees (or current employees reassigned to another job) begin work, they shall be instructed in the recognition of hazards peculiar to their job.

(ii) All employees who are required to use personal protective equipment shall be instructed in the proper methods of use, inspection and care of such equipment.

(iii) Employees who are required by paragraph (e)(1)(v) to use locks and tags shall be trained in the use and application of lockout/tagout procedures. As a minimum, this training shall include a discussion of the procedure, when it is to be used, and the reasons for the procedure. This training shall be conducted annually or more frequently if necessary to ensure that affected employees are aware of the procedure.

(iv) The employer shall ensure that training and education is conducted frequently enough to assure that each employee is able to perform his/her assigned duties in a manner so as not to endanger himself/herself or any other employee. In no case shall this training take place less than annually.

(v) Employees working on rigs shall be trained in operations and procedures to be followed in implementing all plans. No employee shall be permitted to work on rigs unless that employee has either:

(a) Received detailed training on procedures to be followed and methods of implementing all plans.

(b) Is made aware of locations of written plans and when these plans should be implemented.

(4) *Over water operations.* (i) Two emergency means of escape from platforms shall be provided when working over water. Controlled descent devices, which limit the employee's velocity to 15 ft/sec (4.6 m/sec) or slower, emergency escape ladders, stairs or other accessible means may be used for emergency escape.

(ii) Each continuously-manned platform shall be provided with enough lifefloats or alternatives to accommodate all persons present at any one time, but in no case shall there be less than two lifefloats. In addition, the lifefloats or alternatives must be approved by the U.S. Coast Guard. The lifefloats or alternatives shall be placed in accessible locations and mounted on the outboard sides of the working

platform in such a manner as to be readily launched.

(iii) A litter capable of safely hoisting an injured person shall be available and accessible.

(iv) U.S. Coast Guard approved personal flotation devices shall be available and accessible for each employee performing operations over water. When employees are exposed to the potential of falling into the water during specific work tasks, personal flotation devices shall be worn.

(v) At least four U.S. Coast Guard approved ring buoys or equivalent rescue flotation devices, with sufficient attached and secured line to effect a rescue, shall be conspicuously located and readily available for use in water rescue operations. Each ring buoy shall be equipped with an approved water light, or retroreflective material shall be attached to the flotation device for the purpose of locating the flotation device during other than daylight hours.

(iv) Tag lines shall be used to guide and steady equipment being loaded or unloaded from vessels.

(5) *Housekeeping.* (i) Work areas shall be kept free of slipping and tripping hazards. Loose materials, equipment or tools not immediately required for the job shall be removed from walking-working surfaces and stored.

(ii) Flammable liquids may not be used for cleaning purposes.

(iii) Hazardous leaks or spills shall be promptly cleaned up to minimize fire and slipping hazards. Hazardous liquids resulting from the pulling of wet strings of pipe, tubing or rods shall be conveyed away from the rig floor.

(iv) When employees are working in a cellar, no loose equipment or materials shall be in the cellar except those immediately required for the job.

(6) *Illumination.* (i) The lighting on the rig floor shall be at least five foot candles at all work areas.

(ii) The lighting shall be at least 5 foot candles on the derrickman's working platform, work areas around mud pumps, and catwalks.

(iii) The lighting shall be at least 2 foot candles at the shale shaker, stairway and other walking areas.

(iv) Lighting of at least 5 foot candles shall be provided when it is necessary to perform maintenance, including lubrication on the crown block, during other than daylight hours.

(d) *Specific requirements for all operations.* (1) *Raising or lowering derrick or mast and rig-up operations.* (i) Prior to commencing rig-up operations the employer shall plan the arrangement of all equipment and outbuildings to minimize hazardous conditions and to

ensure the operations can be safely accomplished:

(ii) Where change rooms and outbuildings are provided, they may not be located in line with the ends of pressure vessels nor within 30 feet (9.2 m) of rig fuel tanks.

(iii) A visual inspection of the raising and lowering mechanism of the mast shall be made before operations commence. Any problems or defects detected shall be corrected before raising or lowering the mast or derrick.

(iv) Prior to raising or lowering any mast, all tools and materials which are not secured shall be removed from the mast.

(v) Employees may not be under a derrick or mast which is being raised or lowered.

(vi) During rig-up operations, the rotary table opening in the floor shall be covered and remain covered until the rotary table is ready to be moved into place. If this procedure must be changed due to unusual rig-up problems, then all employees exposed to the hazard of falling into the rotary table opening shall be instructed about the hazard and how the new rig-up procedure is to be safely accomplished.

(vii) Truck-mounted masts may not be driven over the ground while in a raised position unless specifically designed for this. This does not apply to the skidding of a drilling rig or pole mast well servicing rig.

(viii) Well operations may not be commenced until the rig is rigged up in a safe manner.

(ix) All air shall be bled from the hydraulic system and the system checked for proper operation before hydraulic cylinders are used to lower derricks or masts.

(2) *Emergency escape.* (i) The derrick or mast on all land-based rigs shall have a means of escape available upon completion of rig-up operations. Trips or pulls may not be made until the emergency escape is available. The means of escape shall be rigged and secured to provide a safe and readily accessible escape route from the derrickman's working platform (monkeyboard, rod basket, tubing board).

(ii) A means of escape shall be rigged and secured to provide a safe and readily accessible escape route before operations commence which require a crew member to be on the stabbing board.

(iii) The emergency escape route shall be kept clear of obstructions and arranged to carry the crew member away from the wellhole and the drilling floor permitting a safe landing.

(iv) If an emergency escape line is used, the employer shall ensure that the tension on the emergency escape line will permit a safe landing for the user.

(v) When the emergency escape device does not have an automatic velocity limiting control, then it must be equipped with an operator controlled braking device so the operator can make a safe landing. For a manually operated braking emergency escape unit, a safe landing shall mean that the person can stop more than 20 feet (6.1 m) from the anchor point.

(vi) For the emergency escape unit that is equipped with an automatic velocity limiting device or controlled descent device, a safe landing shall mean that the person can stop at the anchor point without injury. If used, automatic velocity limiting devices may not permit speed above 15 ft/sec (4.6 m/sec) at the landing. Emergency escape lines shall have their own anchors, separate from rig guying anchors, unless a method is used to permit the safe use of guy anchors.

(3) *Fire prevention and protection.* (i) Drilling rigs shall be equipped with at least four fire extinguishers each having a minimum rating of 40 B:C. The fire extinguishers shall be distributed in those areas where Class B hazards may be present.

(ii) Well servicing rigs shall be equipped with at least two fire extinguishers, each having a minimum rating of 40 B:C. The fire extinguishers shall be distributed in those areas where Class B hazards may be present.

(iii) At least one fire extinguisher with a minimum rating of 2A shall be available on all rigs. The Class A fire protection may be provided by a fire extinguisher with the minimum ratings for A:B:C in lieu of providing an additional extinguisher.

(iv) All fire extinguishers required above shall be installed, maintained and tested in accord with subpart L of this Part.

(v) Effective January 1, 1986, on land locations, pits and open tanks used to circulate flammable liquids shall be located at least 50 feet (15.3m) from the wellhead. Where this distance is not practical, a combustible gas and vapor detection and alarm system shall be used between the wellhead and the pits and open tanks to warn employees of accumulations of flammable vapors.

(vi) On land locations, portable light plants shall be located at least 100 feet (30.5 m) from the wellhead to isolate possible sources of ignition. Equivalent safety and protective measures shall be taken where conditions do not permit maintaining spacing at 100 feet (30.5 m).

(vii) Open flame heaters may not be used in doghouses or outbuildings.

(viii) While operations are in progress at land locations, motor vehicles shall not come within the perimeter of the guy lines, or within 100 feet (30.5 m) of the wellhead if guy lines are not used, except as follows:

(a) When the motor vehicle is required for the operation to take place, or

(b) When an emergency requires a motor vehicle to come into the restricted area.

(ix) When motor vehicles must come into the restricted area, they shall be operated upwind from the wellhead. The time spent in the restricted area shall be kept to a minimum. The area within the guy line perimeter shall be posted with signs visible from normal vehicle approach directions. The signs shall be in accordance with subpart J of this Part.

(x) On land locations, flammable liquids or gases may not be stored within 50 feet (15.3 m) of the wellbore, except for fuel in the tanks of operating equipment. When terrain or location configuration do not permit maintaining this distance, equivalent safety measures shall be effected including gas detection equipment to warn employees of accumulations of flammable vapors. Tanks shall be labeled as to their contents. Drainage from any fuel storage areas shall be in a direction away from the wellhead, change rooms, outbuildings and work areas.

(xi) Iron sulfide shall be kept wet during its removal from tanks or other locations until disposed in a safe manner.

(4) *Handling drilling fluids and chemicals.* (i) Employees handling drilling fluid materials which contain hazardous substances shall be instructed in the risks involved as well as safe handling and personnel protection procedures.

(ii) Employees required to handle chemicals that may irritate or cause injury to skin, eyes, or respiratory systems shall wear personal protective equipment which will protect the hands, eyes, body skin or respiratory system from contact with such chemicals.

(iii) Eye wash equipment, with at least a 15 minute supply of water, shall be readily available at work areas when acids are being used. Where other hazardous chemicals, such as caustics, are used, a minimum of three (3) one quart squeeze bottles of eyewash solution or other treatment procedure, approved by a physician, shall be readily available.

(5) *Operation near overhead power lines.* (i) *Clearances.* Except where the electrical distribution and transmission lines have been deenergized and visibly

grounded at the point of work, or where insulating barriers not a part of, or an attachment to, the derrick or mast have been erected to prevent physical contact with the lines, the derricks or masts shall be operated proximately to power lines only in accordance with the following:

(a) For lines rated 50 kv. or below, minimum clearance between the lines and any part of the derrick or load shall be 10 feet (3.1 m).

(b) For lines rated over 50 kv., minimum clearance between the lines and any part of the derrick or load shall be 10 feet (3.1 m) plus 0.4 inch (.1 m) for each 1 kv. over 50 kv., or twice the length of the line insulator but never less than 10 feet (3.1 m).

(c) In transit with no load and boom folded and/or lowered, the clearance shall be a minimum of 4 feet (1.2 m) vertically and 10 feet (3.1 m) horizontally.

(d) Materials stored near or under an electrical distribution line shall maintain the following clearance: lines rated 50 kv. or less—10 feet (3.1 m) plus maximum dimension of materials stored; lines rated 50 kv. or more—10 feet (3.1 m) plus 0.4 inch (.1 m) for each kv. over 50 kv. plus maximum dimension of material stored.

(ii) *Notification.* Before rigging up or commencing operations under or around power lines where the clearances in paragraph (d)(5)(i) are not maintained, the line owners or their authorized representative shall be notified so the power lines can be moved, relocated or deenergized.

(6) *Handling and racking pipe, drill collars and other tubular materials.*

(i) Racking foundations foundations and storage racks shall be designed to withstand the maximum anticipated load of racked pipe, drill collars and other intended loads.

(ii) Storage racks shall be designed or other means taken to prevent drill collars, pipe and other tubular material from accidentally rolling off the rack.

(iii) No employee shall be permitted to stand or walk or be between the pipe racks and a load of pipe during loading, unloading and transferring operations.

(iv) When pipe or similar material is moved to another rack, the vee-door or other location, it shall be secured. Pipe and drill collars, tubing and rods, and casing which are racked in the derrick or mast, shall be secured except when actually being worked.

(v) Drainage of the drill stem stands shall be provided to minimize the possibility of ice plug formation.

(7) *Riding hoisting equipment.* (i) Employees may not ride hoisting

equipment except as provided in this paragraph.

(a) Employees engaged in drilling operations may ride hoisting equipment under emergency conditions. When riding the travelling block, the employee shall wear a full-body harness attached to a lanyard anchored to the hoisting equipment. The lanyard shall be of such length and elasticity so that the force on the employee will not exceed 1,800 lbs (817 kilograms).

(b) Employees engaged in well servicing operations may ride the travelling block or elevator. When riding the travelling block or elevator, the employee shall wear a full-body harness attached to a lanyard tied off or anchored to the travelling block or elevator bales. The lanyard shall be of such length and elasticity so that the force on the employee will not exceed 1,800 lbs (817 kilograms).

(c) Employees engaged in wireline operations shall use a personnel basket to ride the hoisting equipment.

(i) When an employee rides the hoisting equipment the following conditions shall be met.

(a) The hoisting equipment shall be powered up and powered down, and the driller or operator of the hoisting equipment controls shall maintain visual contact with the employee at all times while the employee is riding.

(b) The travelling block or other apparatus must be equipped with an emergency stop device that cuts off or prevents power from being transmitted to the hoisting equipment, and applies brakes or other means of preventing the equipment from falling.

(c) The hoisting equipment must be brought to a full stop at the working platform to permit the employee to attach his full-body harness to the available lanyard or an anchor point at the working level before unhooking from the hoisting equipment. The reverse procedure shall be used when the employee is preparing to descend.

(iii) No employee shall be permitted to ride hoisting equipment when this equipment is carrying loads.

(8) *Hydrogen sulfide procedures.* (i) Except as provided in (d)(8)(ii) of this paragraph, the employer shall provide for a monitoring program to ensure the safety and health of those employees who may be exposed to hydrogen sulfide. The monitoring program shall include the use of detector tubes, an automatic environmental monitoring system, or other equally effective means. The surveillance areas to be monitored shall include, but are not limited to, the drilling floor around the borehole, the shale shaker and the mud settling tanks. The monitoring program

and procedures shall include a written plan available at the well site for review by the Assistant Secretary or his representative.

(ii) Hydrogen sulfide monitoring is not required in the following circumstances:

(a) Drilling into or through formations that are known never to have produced hydrogen sulfide.

(b) Casing, cementing or completion of a well where hydrogen sulfide has not been detected during drilling.

(c) Workover or other treatment of a well in a formation or zone known never to have produced hydrogen sulfide in the general area.

(iii) When the employee's exposure to hydrogen sulfide gas exceeds those permitted in Subpart Z of this Part, approved respiratory protection equipment must be worn and the emergency action plan required in (c)(2) of this section must be activated. Respiratory protection equipment shall be in accordance with Subpart I of this Part. All employees working in an area of potential exposure to hydrogen sulfide shall wear or carry on their person an approved escape-type self-contained breathing apparatus, or they shall wear or carry on their person a respirator which provides equal or better protection. Those employees who must remain in or reenter the danger area in accordance with the emergency action plan shall have available, in addition to the escape units, an approved positive-pressure respirator to be worn while they remain in or return to the danger area.

(iv) Where an automatic hydrogen sulfide environmental monitoring system is used, it shall be connected to an employee alarm system which will alert employees of danger and allow them to initiate the emergency action plan.

(a) The testing of the automatic hydrogen sulfide environmental monitoring system shall be done at the time of installation to ensure proper functioning of the system, at least daily, prior to "tripping out," and after each "kick" is under control if the monitoring system did not automatically activate.

(b) The automatic hydrogen sulfide environmental monitoring system shall be maintained in operable condition except during repairs or maintenance. When the system is out of service, a manual monitoring program shall be used if work operations continue.

(v) All rigs, except those excluded by (d)(8)(ii) of this section, which are in operation on or after July 1, 1987, shall be equipped with an operable automatic hydrogen sulfide environmental monitoring system.

(9) *Confined spaces.* (i) *General.* (a) All confined spaces shall have gates, covers or other barriers to prevent inadvertent entrance into the space, unless the entrance is so located as to preclude inadvertent entry.

(b) All confined spaces into which employees may be required to enter shall be posted with signs warning of the hazards of entry and when entry is authorized. The sign shall include the name of the person responsible for authorizing entry into the confined space. In addition, the signs shall conform with the general requirements of Subpart J of this Part, and shall be in English and in other languages in common use by the employees.

(ii) *Establishing entry procedures and training requirements.* (a) The employer shall establish procedures for entry into any confined space before allowing employees to enter. All persons required to enter confined spaces (either to work or to perform rescue operations) shall be trained in these entry procedures before entering the confined space.

(b) The entry procedures shall address steps to be taken in the evaluation of hazards known to be present, or which can reasonably be predicted as being present. The procedure shall also address means to eliminate or mitigate the hazards and how to effect rescue in the event a worker within the confined space is trapped or requires assistance to escape. The procedures for communications between persons working within the confined space and those outside shall be established and means provided to maintain the communication link.

(iii) *Evaluation prior to entry.* (a) Prior to entry, the employer shall evaluate the known and potential hazards of entry into the confined space. This evaluation shall consider the reason for the entry and the feasibility of any alternative means of carrying out the work without entry.

(b) The evaluation shall consider the types of hazards which may be encountered, how the hazards may be measured or evaluated, and how the hazards may be controlled.

(c) In evaluating the atmosphere for oxygen content and for the presence of flammable materials, direct-reading instruments shall be used. Employees shall be trained in the proper use of these instruments.

(d) When toxic materials are known to be present, an evaluation of their concentration shall be made. If hand operated test methods such as detector tubes are used for this evaluation, employees shall be trained in the operation of this equipment.

(e) When the evaluations performed in (iii)(c) or (d) of this paragraph indicate the presence of a hazardous condition, steps shall be taken to eliminate or mitigate the hazardous condition, including further sampling which will be representative of the confined space atmosphere.

(iv) *Elimination or mitigation of hazards within confined space.* (a) Hazardous gases and vapors shall be removed by ventilation, purging or cleaning.

(b) Volatile liquids, which can be removed by flushing, cleaning or similar means, shall be removed prior to entry of employees.

(c) Confined spaces containing volatile liquids which cannot be readily removed, and which have toxic vapors that are IDLH, shall be provided with sufficient continuous ventilation to reduce levels of vapors below IDLH level. A warning system shall be provided to warn employees within the confined space in the event of failure of the ventilation.

(d) Where access to the exterior of the confined space allows, all pipes and lines that enter the confined space shall be disconnected and blind flanges or equally effective means used to close off the pipe or line. Where access to the exterior of the confined space is not possible, all pipes or lines entering or conveying or capable of carrying materials into the confined space shall be shut down and means taken to isolate the lines and prevent any flow.

(e) All pipes passing through confined spaces shall be inspected upon initial entry to determine if they are leaking. If leaking pipes are found, the confined space shall be vacated immediately and procedures instituted to stop the leaks before any other work is commenced.

(f) Exposed electrical circuits shall either be shut off and visibly grounded or insulated so that employees will not be exposed to contact.

(g) Mechanical parts within the confined space shall be disconnected and locked out, or otherwise rendered inoperative whenever hazards exist from exposure to moving parts within the confined space.

(h) Whenever the atmosphere within the confined space has the potential of containing or developing conditions IDLH, the employer shall:

(1) Equip each employee entering the confined space with safety lines attached to a belt or full-body harness to permit removal of the employee without rescuers entering the confined space;

(2) Provide an employee who is trained in rescue procedures as an observer outside the confined space,

and who is in communication with those inside the space.

(3) Provide a lifeline system which has a mechanical advantage in lifting of at least two for vertical entry into a confined space.

(4) Ensure that whenever the entry way is smaller in diameter than the width of the entering employee's shoulders, the employee entering the space wears wristlets with separate lines to permit guidance of the hands, arms and torso through the access.

(i) In the presence of any condition known to produce (or potentially capable of producing) a cessation of breathing or of heart action, the employer shall have available a person trained and certified in cardiopulmonary resuscitation (CPR). If the person trained in CPR is not the rescuer or backup to the rescuer, means shall be available at the confined space area to summon promptly the person trained in CPR.

(v) *Additional requirements for entering inerted atmospheres.* When a confined space contains flammable materials, and has been inerted and it is decided that employees must enter this space with an inert gas atmosphere present, the employer shall, in addition to the other provisions of this paragraph:

(a) Provide sufficient flow of inerting gas into an inerted atmosphere to assure that vented air plus leakage plus external circulation into the space does not reach the upper explosive limit.

(b) Provide for warning of any reduction in the inert gas flow into the space below that required to maintain the inert atmosphere within a confined space.

(c) Require all employees to leave confined spaces that have been inerted whenever there is a failure of the inert gas flow or a reduction in concentration below that required to maintain the inert atmosphere.

(d) Ensure that employees do not enter any inerted space unless equipped with belts or harnesses, safety lines, and where vertical entry through restricted openings is to be made, wrist harnesses or wristlets.

(e) Ensure that no employee is permitted to work within a confined space protected by inerting unless a standby person is stationed immediately outside the confined space. The standby person may not undertake any tasks that will prevent immediate notice of any requirement to warn or rescue the employee within the space.

(f) Ensure that employees working within inerted spaces are given training and instruction on the extremely hazardous nature of the work, on how to safely undertake the work, on how to escape in event of difficulty, and the

need to maintain communication with the standby person.

(g) Ensure that standby persons assigned to assist those inside the inerted confined space have been trained to carry out their immediate duties, in the need to maintain communication with employees within the space, in the procedures to warn employees in the event that situations develop that require immediate evacuation, and in rescue procedures.

(vi) *Rescue procedures.*

(a) In the event entry for a rescue is necessary, only trained rescuers shall be used to affect rescue.

(b) Rescuers may not enter a confined space until backup persons have been notified and their immediate availability assured.

(c) Any rescuer entering a confined space shall be equipped with safety lines (including a line rigged with a mechanical advantage of two), wristlets where necessary due to entryway restrictions, and either positive pressure self-contained breathing apparatus or positive pressure air-supplied respirators with backup emergency self-contained air supply, prior to entry.

(e) *Equipment requirements for all operations.* (1) *General requirements.* (i) Openings in the rotary table shall be covered when not occupied by a Kelly drive bushing, pipe or other equipment.

(ii) Unless the rathole and mousehold are occupied with pipe or equipment, they shall be covered or otherwise guarded to prevent employees from stepping into them.

(iii) In accordance with Subpart D of this Part, guardrails shall be provided along the perimeter of the rig floor on all rigs where the fall height is 4 feet (1.2 m) or more above the ground. A chain used across the vee-door in lieu of guardrails shall be considered equivalent.

(iv) A ladder or stair meeting the requirements of Subpart D of this Part shall be provided for employee access and egress where employees work in a cellar 5 feet (1.5 m) or more in depth.

(v) The employer shall implement a lockout and tagout procedure to protect employees who may be exposed to hazards which is likely to cause injury while they are cleaning, servicing, adjusting or maintaining equipment on rigs.

(a) The lockout shall render the equipment inoperative and ensure that power sources may not be energized while the equipment is being cleaned, serviced, adjusted, or maintained.

(b) A tag shall be placed upon equipment controls or equipment operating parts indicating that they have been rendered inoperative; warning that



no inadvertent operation shall be carried out; and displaying the name of the person who placed the lock and tag.

(c) Each employee assigned to clean, repair, adjust, or maintain machinery or equipment shall be provided with locks and keys to be placed upon the equipment.

(d) The employee shall lockout and tagout the equipment prior to starting any or the work covered in this paragraph.

(e) All energy shall be dissipated prior to commencing work on locked out equipment.

(f) Locks shall be removed only by the employee who placed the lock. If it is necessary to remove a lock by other than the employee who placed the lock, then authorization shall be granted by the employee's supervisor, and by one other person authorized by the employer.

(vi) All employees on the rig site shall wear safety-toe footwear meeting the requirements of Subpart I of this Part.

(vii) Machinery may not be operated without all guards in proper position and in safe condition except during repair or maintenance work, or necessary testing of machinery.

(viii) All wire rope used for hoisting purposes shall be of a design strength to lift safely and to handle all anticipated loads under the conditions of service except in emergencies. The maximum working load of the hoisting line shall be based on a minimum design factor of three for all operations. All hoisting lines in use shall be usually inspected daily in accordance with Subpart N of this Part, except no written records are required. The rope shall be removed from service if found to be damaged or worn.

(ix) All pins used to secure chains, lines, clevises, etc., shall be secured.

(2) *Derricks, masts and guying.* (i) All derrick and mast platforms above the rig floor shall be constructed, maintained and secured to the structure to prevent inadvertent movement and to withstand all loads which may be placed on them.

(ii) Except for the ladder opening, no unguarded openings large enough to permit a person to fall through shall exist between the beams or main supports of the crown block.

(iii) All derricks and masts shall have a permanently mounted plate on them which displays the manufacturer's name; load rating including static hook load capacity with number of lines; and the recommended guying pattern when guying is necessary. All derricks and masts manufactured after January 1, 1986, shall display the date of manufacture.

(iv) Tools, parts, and other loose material overhead shall be in the derrick or mast only if there is occasion for their immediate use. Means shall be taken to prevent their falling.

(v) Employees may not work on the rig floor while repair work is in progress directly overhead in the derrick or mast unless their assistance is necessary for accomplishing the overhead job.

(vi) If a derrick or mast is damaged to the extent its safe use cannot be ensured, it shall be removed from service until repaired, and the adequacy of the repair shall be certified as at least equal to original specifications by a professional engineer, the manufacturer, or a repair facility whose capabilities to perform the repairs are certified by the employer in writing.

(vii) If emergency conditions make it impossible immediately to remove from service a derrick or mast that has been damaged, the derrick or mast shall be used only to the extent necessary to control the well, provided no employees are allowed to work in the derrick or mast, and all exposed employees are informed of the hazards that are present and the steps to be taken to avoid them.

(viii) Masts that require use of external guy lines to ensure stability shall have the external guy lines in place immediately following the raising and scoping of the mast.

(ix) The guying system for derricks and masts shall be erected in accordance with the pattern displayed on the mounted plate called for in (e)(2)(iii) of this paragraph. If this pattern cannot be followed due to the terrain or other conditions, then a guying pattern shall be used that provides the same degree of stability against overturning of the mast of derrick.

(x) Guy lines and auxiliary devices shall be inspected prior to each rig-up, and they shall be capable of withstanding all loads anticipated in normal service.

(xi) Tong back-up posts, kelly pull-back posts, tong back-up lines and safety lines may not be secured to the derrick or mast girts or legs unless the girts and legs are so constructed, and the lines so attached, that the stress loads imposed will not result in structural damage to the derrick or mast.

(3) *Derrick or mast ladders.* (i) All fixed ladders over 20 feet (6.1 m) in length mounted on a derrick or mast shall be equipped with a ladder safety device or other device which meets the requirements of Subpart D of this Part.

(ii) Those climbing assist systems which do not limit the maximum descent velocity of the employee to 15 ft/sec (4.6m/sec) or to automatically arrest the

fall of an employee are not acceptable as a ladder safety device.

(iii) Where a climbing assist device is used along with an automatic control descent device, such an arrangement shall be acceptable as a ladder safety device.

(iv) Climbing assist devices shall be adjusted to the weight of the user prior to use, but in no case shall the counterweight exert an upward force greater than 90 percent of the user's weight.

(v) When a climbing assist device is used, provision shall be made to prevent the counterweight from falling in case of sheave or line breakage.

(4) *Foundations and anchors.* (i) Foundations shall be capable of safely distributing the gross weight of the derrick or mast under maximum anticipated hook load as well as all other loads imposed during raising and lowering of the structure.

(ii) Foundation pads shall be graded and adequately drained.

(iii) All installed ground anchors, permanent or temporary, shall meet the pull-out resistance requirements for the conditions of service.

(iv) All permanent ground anchors installed after July 1, 1986, shall be designed to resist the anticipated forces for the conditions of service, and be able to resist the most severe wind loads anticipated once each 100 years.

(v) Trees, rocks, or other naturally occurring items may not be used as anchors.

(vi) The anchor spacing used shall be in accordance with the guying pattern specifications on the permanently mounted plate on the derrick or mast, or in accordance with other arrangement that ensures the stability of the rig.

(vii) The employer shall establish an anchor pull test program for all permanent ground anchors to ensure their safe use. Pull test program results made available to the employer may be used to meet this requirement.

(viii) Permanent anchors shall be visually inspected by the user prior to each use. If damage or deterioration is apparent on inspection, and is such that safe use is not assured, the employer or his designee shall perform a pull test.

(ix) Boomers or load binders may not be used after July 1, 1986, to fasten or tension guy lines or back stays.

*Exception:* Boomers may continue to be used until July 1, 1987, provided equipment is available and used to relieve tension prior to release of the boomer.

(5) *Drawworks.* (i) The drum of the drawworks shall be guarded or located

to prevent employees from falling into the drum or lines.

(ii) The shut-down switch or switches for drawworks shall be readily identifiable and easily accessible in the event of an emergency.

(iii) Moving parts of the drawworks machinery may not be lubricated or adjusted while in operation, unless lubrication or adjustment can be accomplished with certainty without hazard to the employee.

(iv) A visual inspection of the drawworks shall be made on a daily basis to ensure all guards are in place and wire rope is spooled correctly.

(v) The brakes and brake linkage shall be visually inspected on a daily basis for condition and operation. Any defects detected shall be corrected before use.

(vi) The operator in charge of the drawworks shall secure the brake when he leaves the immediate area of the control panel unless the drawworks is equipped with an automatic feed control.

(6) *Drill pipe, casing and tubing slips and tongs.* (i) The handles on slips used for drill pipe, casing and tubing shall be of sufficient length to avoid pinch points for the hands.

(ii) All tongs shall be securely attached to the derrick, mast or a back-up post in accordance with paragraph (e)(2)(xi) of this section, and anchored by a wire rope line or equivalent device having a minimum breaking strength greater than the breaking strength of the pulling line or chain.

(iii) tong safety lines (snub lines) shall be short enough so that the tongs cannot rotate far enough to hit employees working on the side opposite the safety line, and shall have a minimum breaking strength greater than the force of the makeup or breakout torque.

(iv) All fittings and connections shall have a minimum breaking strength greater than the force of makeup or breakout torque. Knots may not be used to fasten line, chain or wire rope.

(v) Power tong pressure systems shall be equipped with a safety-relief valve and the operating pressure of the safety relief valve shall never be higher than the maximum working pressure for which the tong pressure system is designed.

(vi) When working on power tong heads, the pressure inside the system shall be completely relieved before starting repair or other work.

(vii) Counterweights suspended above the rig floor shall be fully enclosed or fitted with safety lines or devices to prevent falling in the event of line or sheave failure.

(7) *Catheads, lines, ropes and chains.*

(i) There shall be adequate clearance or

working area to allow a person to pass without being struck or wedged between the outer flanges of a cathead and any structure such as a guardrail or wall.

(ii) Each cathead on which a rope is manually operated shall have a smooth surface and be free of projections on which employees' clothing may be caught. Catheads shall have a rope guide to hold the on-running rope in alignment with its normal running position against the inner flange.

(iii) A headache post or guard shall be provided to deflect cathead lines away from the driller's position. Where headache posts are of the rotating type, the top and bottom ends shall be guarded to restrain the post if the shaft fractures.

(iv) Each cathead using a chain shall be equipped with a manually operated cathead clutch or similar device to keep the rotation of the cathead under control. The clutch or device shall be of the fail-safe or "nongrab" type, and shall release automatically when not manually held in the engaged position.

(v) All ropes, lines and chains in use shall have a minimum breaking strength at least three times greater than the loads or stresses occurring in regular service. They shall be maintained in safe working condition.

(vi) When a rope or line is in use on a cathead, all other ropes, lines, or hoses shall be placed so that they cannot contact the cathead or the rope or line used on the cathead.

(vii) No rope or line shall be left in contact with the cathead when a cathead is unattended.

(viii) The drawworks controls shall be attended at all times when a manually operated cathead is in use.

(8) *Traveling blocks, crown blocks, hooks and elevators.* (i) The hook assembly shall be equipped with a safety latch or other device to prevent accidental release of the load to be hoisted or lowered.

(ii) Traveling blocks shall be equipped with securely attached sheave guards.

(iii) Effective January 1, 1986, an upward travel limiting device shall be installed on every new derrick or mast hoisting system. The upward travel limiting device shall disengage the power to the hoisting drum and apply the brakes to prevent the travelling blocks from contacting the crown block assembly.

(iv) Elevators shall be equipped with a positive latching and locking device designed to prevent drill pipe or casing from being accidentally or prematurely disengaged.

(v) Traveling blocks, crown blocks and related equipment may not be

subjected to any load in excess of its rated design capacities.

(vi) Adequate clearance shall be maintained between the travelling block and any platform in the derrick or mast to prevent the travelling block from having contact with the platform.

(vii) Crown block assemblies shall be secured in place. This applies to gudgeon caps used to prevent the sheaves from jumping out of bearings and falling to the rig floor. Where bumper blocks are attached to the underside of crown beams, a wire rope safety line or other arrangement shall be fastened along their full length and attached to the derrick at both ends of the bumper block.

(viii) Traveling blocks may not be moved while the crown block is being lubricated.

(ix) The hoisting line may not be removed from the drum until the traveling block is laid on the derrick or mast floor, or until the travelling block is suspended by a separate line or chain.

(x) The deadline anchor for the hoisting line shall be constructed, installed and maintained so that its pullout strength shall be equal to or greater than the working strength of the hoisting line. The anchor shall be so designed that it will not weaken the hoisting line.

(xi) Elevators shall be visually inspected prior to a trip or pull. Elevators with worn or damaged hinge pins or latches which may cause malfunction or failure, shall be removed from service and shall be repaired before use. Replacement hinge pins and latches shall be of the same or greater strength as the originals.

(9) *Weight indicators.* (i) Every drilling and well servicing rig in use shall be equipped with a weight indicator in operating condition.

(ii) The weight indicator shall be mounted so that the display can easily be read by the operator standing at the brake position.

(iii) When the weight indicator is installed at a position 6 feet (1.8 m) or more above the rig floor, it shall be secured to the derrick or mast, and a separate safety line or chain shall also be installed to prevent the indicator from falling in case of failure of mast connections.

(10) *Blowout prevention equipment.* (i) Blowout prevention equipment shall be provided and used when well surface pressures are encountered that present the hazards of a blowout; when such well surface pressures are anticipated to be present at the well site; or when drilling in an area where there is no

prior knowledge of the kinds of well surface pressures to be encountered.

(ii) All blowout preventers, choke lines, kill lines and manifold shall be installed above ground level except where rig structure makes subsurface installation necessary. Casing heads and optional spools installed below ground level shall be readily accessible.

(iii) All pipe fittings, valves and unions placed on or connected to the blowout prevention systems shall have a working pressure capability that exceeds the anticipated well surface pressures.

(iv) The choke lines and kill lines shall be anchored, tied or otherwise secured to prevent whipping resulting from pressure surges.

(v) All ram type blowout preventers and related equipment shall be completely tested before being placed in service. Annular type blowout preventers shall be tested prior to being placed in service in conformance with the manufacturer's published instructions or those of a professional engineer.

(vi) Blowout prevention equipment shall be visually inspected daily while in service. A test which assures proper operation shall be performed at least daily on all the blowout prevention equipment except the blind rams. The blind rams shall only be tested on each round trip with the pipe out of the hole.

(vii) At least one person who is trained in blowout prevention and well control procedures shall be on the well site while employees are present.

(viii) All employees on the rig shall be able to operate the blowout preventer system properly. New employees shall be trained in the operation of the blowout preventer system.

(ix) Blowout prevention and related equipment shall be maintained in serviceable condition. When repairs or other work must be performed on the blowout prevention equipment, drilling and well servicing operations must stop until the blowout prevention equipment is returned to service.

(x) The kelly cock or equivalent shall be used for all drilling operations on new drilling rigs after July 1, 1985. A kelly cock or equivalent shall be accessible and shall be installed between the kelly and the swivel, or between the lower end of the kelly and the topmost section of drill pipe, or both, on all wells where blowout prevention equipment is required. The kelly cock or equivalent shall be capable of withstanding the same well surface pressures as the blowout preventers that are used.

(xi) The kelly cock or equivalent shall be maintained in a serviceable condition

and shall be tested concurrently with the blowout preventers.

(xii) The wrench or other tool used to close the kelly cock or equivalent shall be kept in an accessible place, and its purpose and use made known to all employees who may be expected to use it.

(xiii) The kelly hose shall have a safety line attached at each terminal fitting to prevent the hose from whipping, thrashing or falling to the rig floor.

(11) *Kelly bushing and rotary table.* (i) Rotary equipment, including the rotary table and the kelly bushing, shall be guarded unless the construction and installation prevents the catching or snagging of employees or their clothing or ropes, lines, hoses, chains and similar materials.

(ii) The rotary table may not be used to break connections except under emergency conditions. When the rotary table is used to break a connection, the tongs must be in place on the tool joint, all employees must stand outside of the swing line of the tongs and the snub line, and a stand of pipe shall be positioned high enough in the mousehole to catch the tongs in case the tongs safety line (snub line) breaks. Tongs must be placed so that the snub line has no slack before the rotary is engaged.

(iii) The operator may not engage the power to begin rotation until rotary table is clear of all employees and unsecured materials.

(f) *Additional requirements.* (1) *Well servicing.* (i) The well shall be checked for pressure prior to initiating well servicing operations. If any pressure is found in the well, the pressure shall be safely relieved or procedures shall be established to operate safely under the detected pressure before commencing well servicing operations.

(ii) When well servicing operations are to be performed on a producing well, the pumping unit power shall be turned off and locked out, and the brake set before well servicing operations begin. If the counterweights are not in the down position when the pumping unit is stopped, the counterweights shall be positively secured against movement.

(iii) Employees shall be out of the derrick or mast and cellar when the subsurface pump is being unseated, or when an initial pull on tubing is made.

(iv) Precautions shall be taken upon completion of well servicing operations, to assure that all personnel and equipment are clear of the pumping unit, counterweights and related equipment before the pumping unit is actuated.

(2) *Cementing.* (i) Pump discharge lines shall be tested to a pressure no less than 1,000 psi ( $6.9 \times 10^6$  n/m<sup>2</sup>) over

the maximum anticipated cementing pressure prior to commencing any cementing operation.

(ii) All valves in the discharge lines shall be open before allowing pumping operations to begin.

(iii) Pump operators or their designees shall remain at their operating position while the pump is in operation.

(iv) Cementing pressure may not exceed the manufacturer's maximum safe working pressure of the equipment.

(v) The lead-off connection to the cementing head shall be secured with a safety chain or other device to prevent the lead-off connection and discharge line from falling. The sections of high pressure line from pump to well shall be secured together in case a connection breaks.

(vi) The valve and any sections of cementing line left after completion of cementing operations shall be secured to prevent whipping when pressure is bled off.

(3) *Wireline services.* (i) *Placement and handling of wireline services units.*

(a) Land based mobile service units shall be chocked and/or spaded. If chocked, a minimum of two (2) chocks shall be used, one behind each rear wheel toward the wellhead.

(b) Portable or skid mounted wireline service units shall be secured to prevent any unwanted movement of the unit when a load is taken on the lines.

(c) A wireline service unit shall be located in such a manner that it minimizes interference with the entrance or exit of employees from that unit or other service units.

(d) When handling a wireline which could recoil when released, the loose end shall be secured.

(ii) *Gin poles (telescoping and single post).* If a gin pole is used, it shall be attached to the wellhead or christmas tree to prevent movement when the load is being handled. Devices used to attach the ginpole to the wellhead or christmas tree shall be of such size and strength to support the anticipated load to be handled.

(iii) *Rope falls (block and tackle).* (a) Blocks and nonmetallic rope shall be of such size and strength to support the anticipated load to be handled with a safety factor of three (3).

(b) Splices through the length of the rope may not be used except where the dead end is tied off.

(c) Rope which has been cut, frayed or in any way weakened may not be used.

(d) Damaged or worn blocks may not be used.

(e) Pins used in makeup of sheave wheels shall be secured to avoid displacement.

(iv) *Swabbing, performing, and other wireline operations.* (a) All swab lines, blowdown lines or flow lines to pits or tanks shall be securely anchored to prevent whipping and thrashing. Whenever hydrocarbons or other volatile fluids may be expected, these lines shall extend a minimum distance of 75 feet (22.9 m) from the well and away from any source of ignition. If this is not feasible, detection equipment for flammable atmospheres or procedures using manual detection methods shall be implemented to warn employees of hazardous conditions.

(b) There shall be a lubricator or some other means of controlling well pressure in use on wells where there is a possibility of flow, that will allow the removal of the swab or other tools without turning the well loose to the atmosphere.

(c) While swabbing operations are being conducted, all engines, motors, and any other potential source of ignition not essential to the operation shall be shut down.

(d) Swabbing operations shall be restricted to daylight hours when practicable where flammable gases or liquids may be present in the well or will flow into the well. If it is necessary to conduct swabbing operations under artificial light, then light levels shall be sufficient for employees to conduct the test safely.

(e) The swab line shall be packed off at the surface when swabbing so that fluids are routed through a closed flow system to control flammable emissions to the maximum extent possible.

(f) No employee shall be permitted in the derrick or in the immediate proximity of the wellhead during the time the swab line or other wireline is being run in the hole.

(g) All oil savers shall be of the type that do not require an employee or person to be near the lubricator or wellhead to control the oil saver.

(h) Radio transmitters or receivers may not be operated where perforating operations are in progress, and warning signs warning against the use of radio equipment shall be posted. Such signs shall be conspicuously placed at entrances to the worksite, and at least 200 feet (61 m) from the perforating operation. Signs shall conform to § 1910.145 of this Part.

(i) Devices containing explosives and/or radioactive material, such as perforating guns, logging tools, etc., shall be handled only by qualified employees.

(j) The work area shall be inspected upon completion of perforating operations, and all explosive material and scraps shall be placed in a

container designed for this use and removed from the site.

(k) Electrical grounding and bonding between the wellhead, service units, and rig structure shall be made prior to operating tools using explosives.

(4) *Stripping and snubbing.* (i) An emergency escape system shall be provided and available for each employee working atop hydraulic snubbing equipment.

(ii) The snubbing tower shall be guyed or otherwise supported prior to commencing snubbing operations to prevent it from collapse or turnover.

(iii) Flow lines or bleed-off lines shall be located away from areas frequented by employees such as doghouses, tool boxes etc., or where it is not feasible to so locate these lines, they shall be secured to prevent whipping around if these lines should rupture.

(iv) Two-way communications shall be provided between the snubbing operator and the pump operator. This may be accomplished by hand signals, voice communication or other equally effective means.

(v) Well surface pressure shall be monitored at all time during stripping and snubbing operations.

(vi) All employees involved in the stripping or snubbing operations shall be informed of the maximum working pressure limit of the equipment. The employer shall provide blow down lines with remote control valves to relieve pressure from the wellhead equipment where the working pressure may exceed the established maximum limit of the equipment.

(vii) Gasoline engines may not be used on snubbing operations. Other possible sources of ignition shall be located at least 100 feet (30.5 m) from the wellbore during snubbing operations.

(5) *Drill stem testing.* (i) A fillup line shall be installed exclusively to keep the casing full of drilling fluid. The kill line shall be installed exclusively to provide complete well control. The kill line shall be separate from the fillup line.

(ii) Every test plug used above the rig floor shall be secured by a safety line or chain.

(iii) A reversing valve shall be incorporated in the test tool assembly for test assemblies used after July 1, 1986.

(iv) The swivel and kelly hose may not be used as any part of the test line.

(v) A safety valve of proper size and thread configuration to fit the test string shall be readily available on the rig floor for emergency use.

(vi) Blowout preventers, kill line and fillup line shall be inspected in accordance with § 1910.270(e)(10) to

assure that each is in proper working condition before drill stem test tools are started in the hole. The blowout preventer shall be tested immediately before a drill stem test.

(vii) The mud box shall be hooked up and ready for use before the drill stem test tool is pulled out of the hole.

(viii) A mud can and test plug shall be used on every joint of pipe disconnected when oil and/or gas is found during a drill stem test, unless the drill stem oil and gas contents have been pumped out and replaced with drilling fluid.

(ix) Drill stem testing shall be done during daylight hours whenever practical. If it is necessary to work under artificial light, levels shall be sufficient to allow employees to conduct the test safely.

(x) All ignition sources (including artificial lighting) within 100 feet (30.5 m) of the wellbore shall be controlled to prevent ignition of any gas or liquid vapors that may be released during the testing effort.

(xi) A person with training in the hazards of these tests and their control shall remain at the rig and shall continually supervise the operation during drill stem testing and the removal of pipe after a drill stem test.

(xii) A test line shall be laid to a reserve pit or test tank and shall be effectively anchored. The test line connection to the control head shall be secured.

(6) *Acidizing, fracturing and hot oil operations.* (i) All lines connected from the pumping equipment to the christmas tree or wellbore shall have a check valve installed as close to the wellhead as possible. A check valve shall be placed in each discharge line when a multipump manifold is used, as near the manifold as possible.

(ii) An inspection shall be made before pumping operations begin to ensure that all valves in the discharge lines are open and discharge line connections are in proper position.

(iii) All blending equipment shall be electrically grounded, and all equipment unloading sand or other proppants into a hopper shall be bonded to the blending equipment.

(iv) If charged hoses develop a leak while flammable or combustible liquids are being pumped through them, they shall be covered to prevent the liquid from spraying into the air. All leaking hoses shall be removed from service as soon as practicable.

(v) A pre-treatment pressure test on pump discharge lines shall be made at a pressure at least equal to the maximum expected treating pressure, plus 1,000 psi.

(vi) All ignition sources shall be controlled while pumping flammable or combustible liquids, to prevent ignition of any flammable vapors that may be released.

(vii) All spilled oil or acid shall be disposed promptly by persons wearing rubberized protective clothing or other clothing with equivalent resistance to oil and/or acid penetration.

(7) *Freezing, valve drilling and pipe tapping operations.* (i) Pipe tapping and other similar operations shall be performed during daylight hours whenever practicable. If it is necessary to use artificial light, levels shall be sufficient for employees to perform their work safely.

(ii) The test pressure of all equipment which may be pressurized and used in valve drilling and pipe tapping operations shall be at least twice the known maximum pressure of the well on which the work is being performed.

(iii) After equipment has been rigged up to perform valve drilling or pipe tapping, the equipment shall be pressure tested for a minimum of three (3) minutes to at least one and one-half (1½) times the expected maximum pressure but not to exceed the rated working pressure of either the equipment being tapped or the tapping equipment. A reduction in test pressure shall be made to prevent the possibility of pipe collapse provided that expected pressure does not exceed working limits of the equipment. Any leaks that are found shall be controlled before starting valve drilling or pipe tapping operations.

(iv) Pressure inside the lubricator during the valve drilling and pipe tapping operations shall equal as near as possible the pressure inside the equipment being penetrated.

(v) Frozen plugs shall be pressure tested for at least five minutes from above the plug to a pressure greater than the known wellhead pressure. After the pressure test, all pressure above the plug shall be bled off the pipe and period of at least 15 minutes shall be observed before breaking out the pipe and installing a new valve.

(vi) Frozen plugs may not be thawed using steam or hot water.

(8) *Fishing.* The employer shall review the history of the well and any available geological information (including prediction of high pressure gas and/or hydrogen sulfide) before initiating recovery of fish from a wellbore. Steps shall be taken to control flows if there is any record which indicates that the well may contain high pressure or may flow as a result of the swabbing coincidental to the fish recovery.

(9) *Gas, air or mist drilling.* (i) All compressors used after July 1, 1985, shall

be equipped with pressure relief valves, discharge temperature and pressure gauges and engine shut-off valves.

(ii) The discharge line from each compressor shall be equipped with a check valve and a block valve after July 1, 1985.

(iii) After July 1, 1985, a rotating blowout preventer or pipe-wiper-type dust deflector shall be used on the blowout preventer assembly on those wells with well surface pressures less than 500 psi ( $3.5 \times 10^6$  n/m<sup>2</sup>). Wells with surface pressures of 500 psi ( $3.5 \times 10^6$  n/m<sup>2</sup>) or higher shall use a rotating blowout preventer on the blowout preventer assembly. The rotating head shall be equipped with an automatic lubricator, or a lubrication procedure and schedule shall be implemented to keep the rotating head properly lubricated.

(iv) The blooey and bleed-off lines shall be located and securely anchored from the rig so as not to endanger the employees. The blooey line shall be the same diameter or larger than the rotating head outlet.

(v) After July 1, 1985, there shall be two valves installed in the standpipe; one readily accessible on the rig floor, and the other at ground level below the rig floor, with which to control the gas, air or mist supply to the borehole.

(vi) After July 1, 1985, in gas drilling operations, a shut-off valve shall be installed on the main feeder line remote from the wellbore.

(vii) Natural gas fuel lines shall have a master valve located on the main fuel line upstream and away from any compressor.

(viii) A complete operable system for killing the well with drilling fluid shall be readily available before drilling is started.

(ix) Kill switcher shall be provided for the drilling engines and shall be accessible, mounted on or near the driller's console for immediate use.

(x) Employees involved in gas, air or mist drilling operations shall be informed about the proper working procedures for the gas, air or mist supply and circulating system and how to use the emergency shut-off valves.

(xi) The stripper rubber in the circulating head shall be inspected at least once each tour. When leaks are detected they shall be promptly repaired.

(xii) An effective pilot light or other continuous ignition device shall be kept burning at the end of the flow line at all times during the drilling operation, except when making trips. An effective means of reignition shall be available in event of failure of pilot light or ignition device.

(xiii) The standpipe valve shall be closed when making a connection and the bleed-off line opened before breaking out the tool joint.

(xiv) Upon returning to the bottom of the hole at the conclusion of a trip in gas drilling operations, all air shall be purged out of the circulating system before lighting the flare.

(xv) Ignition sources in the area around the wellbore shall be controlled to prevent ignition of flammable gas or vapor that may be present.

(xvi) Valves on choke lines or relief lines below blind rams shall be opened to bleed off any pressure that may have accumulated before opening the blind rams.

**Note.**—The following appendices to § 1910.270 serve as non-mandatory guidelines to assist employers and employees in complying with the requirements of this section in Subpart R, as well as to provide other helpful information.

#### Appendix A to § 1910.270

##### *Oil and Gas Well Drilling and Servicing*

1. *Medical and first aid.* The training programs provided by the American Red Cross or the American Petroleum Institute, which provide certification upon successful completion, are examples of acceptable first aid and rescue training.

At well sites where employees of more than one employer are present at the same time, it is not necessary that each employer assure that at least one person (with a current first aid certification) remain on the site. Instead, it is suggested that the employers make arrangements with each other to ensure that this requirement is met. For example, if three employers are working on the same site at the same time, only one of the three employers need designate a person to meet the first aid requirement.

A contingency plan needs to be developed and implemented for each rig to be used in the event of a medical emergency. This plan should be based on consultation between employers and local providers of medical and emergency services to determine the most efficient means of contacting sources of assistance in case help is needed to provide transportation or medical care for injured employees. The contingency plan needs to address specifically what arrangements have been made for communications with the source of medical assistance and for transportation of injured employees.

An operational two-way radio or a telephone located at the well site are examples of acceptable arrangements for communications. If these are not feasible, OSHA suggests that an alternate instrument of communication be located close to the well site. If the choice is to use locally-provided pay telephones, then the employer must ascertain that the new telephone is in working condition.

OSHA is not requiring the employer to have an ambulance on site during operations. OSHA does intend that preplanned



arrangements via the contingency plan be made for the transportation of injured personnel requiring more than first aid treatment. These requirements can be met in several ways. The employer can choose to make arrangements with local providers of emergency services to supply a vehicle, such as an ambulance or helicopter, which meets the stated requirements on an "as needed" basis. If local emergency care is not available or suitable, then another acceptable option would be for the employer to supply and/or designate an appropriate vehicle, such as a pickup truck with an enclosed rear compartment (a camper shell covering the bed) or a suitable station wagon, as the transport vehicle. If this option is used then the vehicle must meet the other requirements of this paragraph, and the employer would need to designate the appropriate people to operate the vehicle and render assistance.

Due to the high mobility of a rig involved in servicing and special services operations, OSHA does not require a specific contingency for each well site, but rather an outline of the procedure to be followed under the plan, no matter where the rig is operating. In the event a rig is moved to an area where some of the details of the contingency plan become invalid, the plan must be modified to reflect the circumstances at the new location. The main components of the plan in most cases will still be valid, but other details such as telephone number or radio call signs may have to be changed.

**2. Emergency planning.** The emergency action must address emergency situations which the employer may reasonably expect at the well site. Issues which need to be discussed in the emergency action plan include emergency escape procedures and escape routes; procedures to be followed by employees who remain or return to the site; accounting for employees after evaluation assignment of rescue, medical, and other necessary duties; reporting emergencies; and who to contact for more information or an explanation of the plan. Additionally, the employer must designate in the emergency action plan the type of evacuation (total or partial) to be used in each type of emergency that is being considered.

Special attention should be given to the procedures to be followed by employees remaining in or returning to the danger zone. In this section of the emergency action plan, the employer needs to specify such things as what is to be accomplished before the employee evacuates the area, and how long the employee can remain in the danger zone. Additionally, if employees return to the area, the plan must specify what types of personal protective equipment are to be used, communications requirement (e.g., check in every 10 minute) or if employees are to work alone or in pairs, etc.

Details of this plan need not be elaborate or complicated. For example, evacuation instructions for a derrickman during a blowout could be as simple as "use the emergency escape (geronimo, slide, etc.) to get out of the derrick. Once on the ground, move at least 100 feet up wind and remain there until further instructions are received."

Alarm systems which meet the provisions for employee alarm systems detailed in

§ 1910.165 are acceptable for use on drilling and servicing rigs.

As with the medical contingency plan, the employer has the option of providing a written plan available on site or of developing a plan, training employees in all aspects of the plan and certifying that the development and training required has been done.

The employer needs to review the plan with each employee upon initial assignment, when the plan is initially implemented, whenever the employee's responsibilities or designated actions change, and whenever the plan is changed. The contingency plan, which is for medical assistance, may be made part of the emergency action plan if desired.

OSHA recommends the use of written plans which are available at the worksite. The Agency believes these will be more beneficial to employee safety for several reasons. Due to the highly transient nature of the workforce in this industry, a written plan, available at the worksite would immediately enable even newly hired employees to get accurate information concerning these plans. The same would apply to contract employees working on the site. Further, each shift or tour would get the same information and have the plan available for reference should a question or problem arise. Additionally, this would allow for easier implementations of any changes in the plans. Finally, in emergency situations it may be more advantageous to have a written plan available to use as a guide than to attempt to implement a plan from memory.

**3. Employee training and education.** OSHA is not requiring the employer to provide formal classroom instruction for rig employees. Informal presentations by a knowledgeable person outlining hazards which can be encountered by the employee are considered to be acceptable. OSHA recommends that new employees be given a thorough overview of hazard recognition as it applies to the whole rig and the entire crew. This has the potential of bringing about detection and correction of hazardous conditions before an accident can occur.

It is OSHA's intent that the employees fully understand the training they receive. An employer whose workforce has non-English speaking employees will need to provide effective training for these employees in their own language.

The initial training an employee receives must not be the only training the employee receives. OSHA's intent is that training is to be conducted often enough to enable the employees to perform their jobs or duties in a safe manner. A series of informal presentations such as "tailgate sessions" delivered on a regular basis to review the principles of hazard recognition and avoidance are acceptable as meeting the retraining requirements of this section. In these types of presentations, the employer might want to initiate a discussion of recent "near misses" or "close calls" or incidents that happened at other sites. Using these incidents as examples, the discussion leader can talk about the causes and what could have been done to prevent the incidents.

Employee training in the proper use, inspection and care of personal protective

equipment is essential. This training also needs to emphasize that the personal protective equipment is necessary because of the hazards which are present, and should specify the possible consequences of not using or improperly using the equipment. Types of personal protective equipment that may require training include respirators, hearing protectors (muffs and plugs), eye and face protection, head protection, foot protection and safety belts and body harnesses. This training must emphasize that personal protective equipment including respirators must be cleaned after each use and properly stored to prevent contamination.

As stated earlier, OSHA is not requiring formal classroom training for employees, but this does not limit employers from using this method of training. Acceptable training materials designed for use in a classroom setting are available from several sources, including the University of Texas at Austin, the American Petroleum Institute, and the International Association of Drilling Contractors. Additionally, some sources such as Louisiana State University maintain their own training facilities and offer courses directly related to this industry.

Throughout this standard, OSHA emphasizes specific subjects which need to be addressed through training. For convenience, these are listed and include: the application and use of lockout and tagout procedures; medical contingency plan procedures; hazards related to procedural changes in rig-up operations; safe handling procedures and personal protective procedures for use with hazardous materials; emergency escape procedures and emergency action plans; confined space entry and rescue procedures; operation of the blowout prevention system; and well control procedures.

**4. Over water operations.** Rigs meeting the requirements of the U.S. Coast Guard for over water operations are considered to be in compliance with the provisions of this standard.

Depending on the location and height of the platform above the water, and the depth of the water in the area of the rig, being able to jump safely from two different locations on the platform could meet this requirement. For example, a 15 foot jump in 25 feet of water would be acceptable.

The employer needs to supply a sufficient number of lifefloats to accommodate all persons aboard the rig at any given time. Life vests are not considered lifefloats.

It is suggested that at least one extra lifefloat be available on each continuously manned platform in case one of the primary lifefloats is damaged or cannot be launched.

U.S. Coast Guard approved lifefloats are equipped with painters (bow lines), water lights and paddles in addition to other required equipment.

OSHA recommends that extra personal flotation devices be available on rigs performing operations over water in case an emergency situation precludes employees from reaching their assigned flotation devices. These extra flotation devices should be located in conspicuous storage areas

which are readily accessible from "common" areas such as dining halls, recreation areas, regular work stations, etc.

OSHA recommends that more than one rescue flotation device be placed on each side of the rig to speed up any rescue required and/or to allow for multiple rescues if needed.

A standby vessel equipped with a radio and capable of rendering immediate rescue assistance should be in attendance near off-shore installations while the installation is manned.

Training for crews of over water rigs is to include proper water entry procedures. This discussion should cover the correct way to put on personal flotation devices and proper procedures for launching lifeboats. OSHA recommends extensive hands-on training in these areas.

OSHA recommends additional fire fighting equipment be placed on all over water rigs. These facilities are usually isolated from customary response units, and equipment in excess of the requirements of this standard may be necessary to contain large fires.

**5. Housekeeping.** Each employer needs to establish a housekeeping program designed to eliminate tripping and slipping hazards. This program must provide for removal and storage of loose materials found in work areas, the doghouse, change rooms, and on stairs and ramps. This program must also ensure the prompt cleanup of leaks or spills which pose slipping or fire hazards. The program also needs to establish a schedule for the entire drill floor to be washed and hosed down to remove any residue left from spot cleanups. Flammable liquids, those with a flashpoint less than 100° F (such as gasoline, acetone, etc.), are not to be used for cleaning purposes.

OSHA recommends that non-slip floor covering be used on rig floors. Additionally, the employer needs to make sure that elevated work platforms, such as tubing boards, stabbing boards, etc., are designed, equipped, and/or maintained so as to provide good footing for employees required to work on these platforms. Slipping hazards are a major concern, and the employer might want to consider using metal grating or metal floors which are corrugated, knurled, dimpled, or coated with skid-resistant material, in these areas to eliminate the possibility of slipping.

**6. Illumination.** The illumination requirements of this standard represent the minimum acceptable level of rig lighting. OSHA recommends higher levels of illumination to minimize shadows and darkened areas at work stations and other areas on the rig. Since wiring and lighting fixtures are usually present, providing additional illumination would enhance productivity and would provide safer conditions.

All lighting on rigs needs to be of the type approved for use in accordance with the National Electrical Code and Subpart S of Part 1910.

**7. Raising or lowering derrick or mast and rig-up operations.** Employers need to preplan the layout of equipment and outbuildings at the well site. Not only will this preplanning identify potentially hazardous conditions, but

it will facilitate meeting the spacing requirements of other parts of this standard, help to minimize materials handling problems, and allow control of vehicle movement patterns. For example, the fire prevention and protection section of this standard specifies spacing requirements for certain pieces of equipment and for storage of flammable liquids. The same section also restricts motor vehicle access within 100 feet of the wellhead.

Proper preplanning will identify these requirements, and the layout of the site can be made to conform to the standard for less cost. In some circumstances, the preplanning will show that it is not feasible to meet the distance requirements of the standard due to terrain or other restrictions. In these cases, the employer is alerted to the fact that other means, as permitted by the standard, will have to be used to ensure the safety of the workers. Acceptable options for these requirements are discussed later in the appendix.

The employer must require that all employees who are near or involved in the raising and lowering operations wear hard hats. This precaution is necessary in case secured materials come loose or an unsecured tool or other object was inadvertently left in the derrick or mast.

Manufacturers' specifications should be consulted when establishing rig-up procedures to ensure that the employers' procedures are sufficient to allow rigging up in a safe manner.

**8. Emergency escape.** OSHA does not specify any particular means of emergency escape from either the derrickman's work platform or the stabbing board. These requirements can be met in a number of ways including a "geronimo line," a slide, a controlled descent device, a slide sock or any other arrangement which will quickly carry the crew member away from the well hole and the rig. It is OSHA's intent that employees required to use the emergency escape device be thoroughly familiar with it and its proper use, and be required to practice with the device on a regular basis.

The employer needs to make sure the path of the emergency escape device does not endanger the user by crossing vehicle traffic paths, or by coming too close to power lines, fences, pipe racks, or other machinery and equipment. This is another example of how preplanning can prevent hazards.

The automatic velocity limiting device used for emergency escape may permit speeds faster than 15 feet per second at take off and during descent to permit as rapid as evacuation as possible, but the device must slow the user to 15 feet per second or less at the time of landing. This speed is equal to about 10 mph, and OSHA believes landings at this speed or slower can be accomplished safely. Landings at speeds in excess of this requirement could cause the crew member to be injured and thus prevent escape.

**9. Fire prevention and protection.** The requirements of this standard for fire extinguishers with a minimum rating of 40 B:C can be met in several ways. For example, a typical 20 pound ABC dry chemical fire extinguisher with a charge of ammonium phosphate will not only meet the requirement

for a 40 B:C rated fire extinguisher, but may also meet the additional proposed requirements to have at least one extinguisher with a minimum rating of 2A. Additionally, a typical 10 pound B:C dry chemical fire extinguisher with a charge of potassium bicarbonate, or a typical 20 pound charge of sodium bicarbonate, will usually meet the requirements for the minimum 40 B:C rating.

It is OSHA's intent that all fire extinguishers required by this standard be installed, maintained, tested, recharged, etc., in accordance with Subpart L of this Part. These operations may be performed by a contractor or by qualified employees of the rig owner.

The equivalent safety and protective measures required when portable light plants are located with 100 feet of the well should include, but are not limited to, locating the light plant upwind from the wellhead or hidden behind hills, and the use of spark arrestors on the exhaust pipe of the generator's power unit.

The equivalent safety measures required when storage of flammable liquids are within 50 feet of the wellbore should include, but are not limited to, storing the flammable liquids behind a nearby hill, storage in a cool place to minimize vapor production, and locating storage areas according to prevailing wind patterns.

**10. Handling drilling fluids and chemicals.** Depending on the contents and physical state of the drilling fluid materials and/or drilling fluids additives to be handled, the employee may be required to wear a respirator in addition to other personal protective equipment. For example, additives used to control the pH of the mud may include calcium oxide (lime) and sodium hydroxide (caustic soda). Both of these chemicals are body tissue irritants due to their alkalinity. Dermatitis can result from repeated skin contact, and pulmonary irritation may result from inhalation of dust or mist. These types of chemicals would require the use of appropriate respiratory protection in addition to other personal protective equipment including clothing.

The area with the greatest potential for exposure to toxic substances is around the mud mixing hopper. In this area, bags or containers of mud ingredients or additives are opened and dumped into the fluid. This process can lead to high levels of airborne dust or liquid spills. If toxic substances are present in the materials, this could present a potential exposure situation.

Personal protective equipment which needs to be used when handling drilling fluids and chemicals can include, but is not limited to, gloves, aprons, safety goggles, chemical resistant boots and respirators.

It is OSHA's intent that the eye wash equipment needed in work areas where acid is used be self-contained and portable. This would allow the units to be transferred from one rig to another as job requirements dictate. OSHA believes these units are a necessary precaution when the work involves the use of acids. Acid splashed in the eyes could easily result in total loss of sight. The best treatment for this type of accident is

immediate and continuous irrigation of the eyes with potable water, saline solution or a specially prepared eyewash permitted by a physician. It is essential that this treatment be started immediately and that the flushing continue for some time to insure that the acid is completely washed away. After this is completed, the victim should receive expert medical assistance promptly.

Other ingredients used in drilling fluid can also pose a hazard to the eyes. The problems caused by these ingredients vary, but are usually not as severe as those posed by the use of acids. Because of this, OSHA feels that three one-quart bottles of an approved eyewash solution will be sufficient initially to counteract any anticipated problems which could be caused by eye contact with these ingredients. The affected employee should then proceed to a source of potable water and continue to flush the eyes for at least 15 minutes before being taken to receive expert medical attention.

Additional information on emergency eyewash equipment is available in ANSI Z-358.1-1981.

OSHA also strongly recommends that a regular washing facility be available to allow employees to remove any contaminants which may have contacted exposed areas of the skin.

**11. Handling and racking pipe and drill collars.** Securing pipe means that the pipe is retained or controlled in such a manner to prevent inadvertent or unwanted movement. For example, a length of pipe temporarily stored in the vee-door and tied off to the railing is considered secured. An acceptable means for securing the pipe on the rack is where pins are used to prevent unintentional rolling of pipe.

**12. Riding hoisting equipment.** Emergency conditions are those conditions which are life threatening or potentially life threatening, and which necessitate riding hoisting equipment as a means of escape, access or rescue.

Full body harness means a design of straps which can be secured about the user in a manner to distribute the arresting forces over at least the thighs, shoulders, and waist or chest. These harnesses also have provisions for attaching a lanyard or deceleration device or both. OSHA is requiring full body harnesses instead of body belts because these harnesses distribute arresting forces to the entire body through the skeletal structure and, therefore, are less likely to cause injury when compared to a body or safety belt under the same fall conditions.

A one-half (1/2) inch nylon rope in serviceable condition is acceptable for use as a lanyard, but manila rope regardless of diameter is not permitted.

Under conditions where riding hoisting equipment is permitted, OSHA is requiring the equipment to be powered up and powered down. It is OSHA's intent to curtail the practice of letting the equipment drop (free wheeling) and using the brake to control the descent. OSHA believes this is a dangerous practice. This practice puts excessive strains on the braking system, which increases the chances of a brake failure. Brake failure under these conditions could result in death or serious injury to the

employee riding the hoisting equipment. When the operator "powers down," the equipment is under full control of the operator using the mechanical moving system, and reliance is not placed solely on the brake. The brake can then serve as an emergency backup system.

OSHA also requires an emergency stop device to be used when employees are permitted to ride hoisting equipment.

Finally, OSHA prohibits employees from riding equipment when the equipment is carrying a load. For example, an employee may not ride hoisting equipment to reach the monkeyboard while that equipment is being used to pull rods or tubing.

**13. Hydrogen sulfide procedures.** It is OSHA's recommendation that the hydrogen sulfide monitoring be accomplished primarily by the use of an automatic environmental monitoring system. Detector tubes and badges should be used to supplement the automatic system by providing concentration data for areas not monitored by the system. It is not OSHA's intent to limit the use of any new technology which can be used to meet the monitoring requirements as long as the new technology will provide the same or greater protection for the worker.

Hydrogen sulfide monitoring is required for operations in areas where there is known potential for exposure to this gas, where there is no information or inconclusive information as to the presence of hydrogen sulfide.

The escape-type self-contained breathing apparatus required by OSHA is a compact, lightweight, NIOSH approved device which has at least a five minute supply of air. These units can be carried on the pants belt or on a strap over the shoulder. Activation of these units is usually accomplished by either biting into the mouthpiece or by pulling a hood over the head. These units are strictly escape units and are designed to be put on quickly and activated while on the run.

The alarm system used to alert employees of a hydrogen sulfide breakout or concentrations above a predetermined level must have an audible signal or other means which will promptly alert employees to the hazardous conditions.

The manual monitoring required when the automatic system is out of service can include, but is not limited to, the use of detector tubes or the use of badges treated with lead acetate which change colors when exposed to hydrogen sulfide above 5 ppm. The major drawback of these badges is that they give no indication of exact concentration when it is above 5 ppm. By the time a condition is noticed, it could be fatal.

Practices which OSHA suggests to control or limit hydrogen sulfide exposure includes.

- automatic igniters on flare from the degasser, chock manifold and mud-gas separator to burn off hydrogen sulfide.
- all internal combustion engines in known or suspected hydrogen sulfide areas should be fitted with spark arrestors to lessen the chances of the engine acting as a source of ignition in the event of blowout.
- drilling mud should be checked on a regular, predetermined basis to assure that it is of the right constituents and pH to counteract hydrogen sulfide.

—hydrogen sulfide neutralizer can be added to the drilling mud to prevent the gas from reaching the surface. These neutralizers make the mud more alkaline or basic which reacts with acidic hydrogen sulfide and causes the hydrogen sulfide to become a harmless salt.

—installation of hydrogen sulfide monitoring systems on all rigs working within 1000 feet of known or suspected hydrogen sulfide zones.

**14. Confined space entry.** Although the scope of this problem is small because entry into confined spaces is normally not permitted by the employer in this industry, the consequences which result from employee entry without using proper equipment and/or procedures are frequently catastrophic. Therefore, the employer needs to make sure that entry is addressed in the regular safety training program and to take certain actions to protect those employees who may be expected to work in these spaces. First, the employer needs to limit access to confined spaces and to post warning signs. The employer also needs to establish entry procedures to be used by employees if the employer is going to require them to work in confined spaces. These provisions need to include requirements for evaluating the environment before entry, and for periodic evaluation during the time employees are in the confined space. Other issues which need to be addressed in these procedures include what instruments are to be used to evaluate the confined space environment; how often to sample; and what steps are to be taken to reduce any hazards detected. The employer also needs to address rescue procedures for confined spaces. The most appropriate place to do this is in the emergency action plan required by this standard.

When toxic chemicals cannot be completely purged from a confined space, OSHA is requiring that their concentrations be reduced to, and maintained at, a safe level while employees are working in the confined space. The definition of "safe level" will depend on the contaminant involved and the specific exposure situation. Generally speaking, a safe level will be one which is below the IDLH level and will permit exposure for the time required to complete the work to be done. For example, consider a chemical that has permissible exposure limit of 200 parts per million, 8-hours time weighted average, with no ceiling value, and an IDLH level of 5,000 parts per million. An exposure to a concentration of 500 parts per million for five minutes would be safe.

A short term exposure to contaminants at concentrations at or below the published 8-hour time weighted average permissible exposure limits is considered safe.

The employer can determine if an exposure level is safe in several ways. The employer may choose to conduct with a consulting firm on an as needed basis to make this determination. Secondly, if the employer is located in a state(s) which provides a safety and health consultation service, the employer may choose to use that service. Finally, the employer may choose to make the

determination. To make this determination, the employer needs to consider several factors including the time necessary to complete the required work (exposure time); the characteristics of the contaminant (toxicity); and the exposure situation (characteristics of the confined space). The employer also needs to consult various published sources of permissible exposure levels, or recommended ceiling levels. Several of these sources are listed in Appendix C of this proposal.

Finally, the employer needs to provide training for employees required to enter confined spaces. This training needs to address the procedures required for confined space entry; evaluating the environment, including proper operation of sampling instruments; steps to reduce any hazards detected; and proper rescue procedures for use in confined spaces.

15. *Equipment.* Lining the mousehole and rathole with casing that extends two (2) feet above the drill floor is considered an acceptable way to prevent employees from stepping into these holes.

It is not OSHA's intent to require a permanent ladder or stairs be installed in all cellars which are five feet or more in depth. A portable ladder meeting the requirements of Subpart D of this Part is acceptable as a means of ingress and exit.

The employer needs to implement a lockout and tagout procedure which renders equipment inoperative when maintenance and similar work is being conducted.

16. *Derricks, masts and guying.* Tools, parts and other materials immediately required for use in the derrick or mast need to be fastened to a solid object such as a girt by a sufficient amount of rope to allow easy use, or installation, but which will not allow the tool or part to fall to the rig floor if dropped.

When a rig is in need of major repair, it is OSHA's intent to allow employers to use their own repair facilities or other local repair facilities instead of bringing in a professional engineer or manufacturer's representatives. The main requirement of this provision is that the employer must certify in writing that the facility is capable of repairing the equipment to a condition which will at least equal original specifications.

The inspection of the guyline and auxiliary devices prior to each rig-up are meant to be visual inspections to detect weak or broken wires, kinks, or other obvious trouble spots. No written records are required, but any defects detected must be corrected before rigging up.

OSHA recommends that periodic checks of the hook be made to ascertain if any deterioration of structural integrity has occurred.

17. *Derrick or mast ladders.* These ladders need to have a fall control system which could be a fall arrest system (a ladder safety device which stops the fall almost immediately by a belt attached to slide mechanism on the ladder or a cable) or a control descent device, which limits the velocity of the falling person. Additionally, offset platforms may be used which limit the length of a ladder section to 20 feet or less. A climbing assist device may be used with any of these systems, but it will not be acceptable

by itself as the fall control system. By adjusting the climbing assist device to 90 percent of the weight of the lightest user, it will not have to be adjusted again for all who use it. Counterweights need to be fully enclosed of fitted with safety devices to prevent falling in the event of line or sheave failure.

18. *Foundations and anchors.* The employer needs to develop and establish an anchor pull test program. This program should be based on a representative sample of the various sizes and types of anchors in use and the soil types in which they are used. It is OSHA's intent to allow the employer to use results of valid pull tests performed by the well owner to meet the requirements of the standard, provided the results are available to the employer.

A "come-along" can be used to relieve tension on the boomer before release and will meet the requirements of the exception allowed in § 1910.270(e)(4)(viii).

19. *Drawworks.* It is not OSHA's intent to require elaborate machine guarding measures to be used to guard the drawworks. Proper location and/or normal machine guarding techniques, which may include guardrail systems or other physical restraints combined with the establishment and implementation of work rules or work practices to keep employees out of danger areas, will meet these requirements.

The employer needs to make sure that shut-down switches for the drawworks are easily identifiable. Also, the employer needs to initiate a daily inspection program to check visually for such things as guards being in place, correct spooling of wire rope, and condition and operation of the brakes and brake linkage.

20. *Drill pipe, casing and tubing slips and gongs.* The handles on the drill pipe, casing and tubing slips should not be any longer than necessary for the work because of the potential danger of employees being hit by the handles if the slips swing. However, the handles must be sufficiently long to enable employees to use this equipment without catching their hands or fingers.

OSHA recommends that all tong lines be inspected daily and replaced as needed.

21. *Catheads, lines, ropes and chains.* Ropes, lines, and chains inspected and maintained in accordance with the requirements of Subpart N of this Part for derrick ropes are considered to be maintained in safe working condition.

Preplanning of rig layout will help to ensure sufficient clearance for safe movement between the cathead and other surrounding structures.

The employer needs to initiate an inspection and maintenance program which includes periodic visual inspection of the cathead to ensure that the surface is smooth and free of objections to prevent fouling. If the surface is found to be defective, the cathead should be rebuilt and turned to eliminate defects. The rope guide on the cathead also needs to be checked periodically and realigned if necessary.

All employees who use the cathead must be familiar with the correct operation. The employer also needs to establish effective work practices which will eliminate the

likelihood of accidents related to cathead operations. For example:

- prohibit line or rope to be left in contact with an unattended cathead.
- Require drawworks control to be attended while a cathead is in use.
- require precautions to be taken to prevent entanglement of other lines, ropes or hoses with a line in use in the cathead.

22. *Traveling blocks, crown blocks, hooks and elevators.* A retaining device or tie, known as a mouse, is acceptable in lieu of a safety latch.

It is OSHA's intent that the traveling block not be operated unless it is equipped with proper guards and the guards are in place.

23. *Blowout prevention equipment.* The requirement for a person to be trained in blowout prevention and well control procedures can be met by having the designated person attend the appropriate course(s) at recognized training institutions as well as by on-the-job experience, or training conducted by another qualified person. Examples of institutions which offer well control training are Louisiana State University, Texas A and M University, the University of Oklahoma, Alaska Skill Center, Cape Cod Community College, Penn State University and Ventura College.

OSHA recommends that at least one employee be sent to well control school, and that employee to train his fellow employees. All personnel should receive well control training in addition to being trained in the operation of the blowout prevention system. This could prove to be beneficial in case the primary person responsible for well control is injured or is unavailable during an emergency situation.

It is OSHA's intent that the required visual inspection be done during normal drilling, for example, with a few feet of kelly still to go. The inspection should include a check for such things as positive pressure on the valves and accessibility to manual controls.

The operational test should be performed at the time of adding a joint of pipe, after the kelly is pulled and the slips are in place. At this time, for testing purposes, the driller should actuate the annular rams, etc. The complete test should only take a few minutes.

24. *Kelly bushing and rotary table.* It is OSHA's intent to exclude from the guarding requirements kelly bushings whose construction or installation prevent catching or snagging employee clothing or ropes, lines, hoses, chains or similar materials. Information concerning alternate abatement measures may be obtained from OSHA Regional Offices.

25. *Well servicing.* The employer needs to establish work practices which will reduce the chances of accidents occurring during all servicing operations. For example:

- requiring that all wells be chicked for pressure before beginning operations.
- requiring that any pressure found in a well be relieved or other precautions taken before servicing begins.
- prohibiting employees from being in the derrick, mast or cellar during the unseating of the pump or initial pull on tubing.

—requiring all personnel to be clear of the pumping unit, etc., before the pump is restarted.

Each of these work practices should be incorporated into the initial training each employee receives and should be reinforced at subsequent training sessions.

26. *Special services operations.* Employers engaged in special services operations need to establish effective work practices which address hazardous conditions peculiar to their operations. These work practices need to be brought to the employees' attention during initial training and reinforced through subsequent training. The employer should not only explain the safety procedures that are expected to be followed, but should also explain the hazard it is intended to reduce and the consequences of not using the required work practices.

It is OSHA's intent to restrict swabbing operations and drill stem testing to daylight hours whenever practical. If these operations must be performed in other than daylight, using artificial light, the employer needs to make sure the lighting meets all requirements for Class I Division I locations of Subpart S of this Part.

When terrain or other limitations make it impossible to extend swab lines, blow down lines or flow lines at least 75 feet from the well, other acceptable safety precautions which could be taken include positioning lines to discharge down wind from the well and/or other sources of ignition, and flaring off any volatiles.

Employers engaged in acidizing operations need to assure that the requirements for personal protective equipment are being followed by their employees and that eye wash equipment is readily available.

During freezing operations performed in order to drill out and replace a valve, after the new valve is installed, the void space between the frozen plug and valve should be filled with water.

All compressors used for gas, air or mist drilling operations need to be equipped with properly set pressure relief valves, and pressure gauges and engine shutoff valves. Additionally, OSHA recommends discharge temperature gauges.

27. *Rig electrical systems.* Rigs which meet the requirements of the American Petroleum Institute's RP 54, Section 9 (January 1981) will be considered to be in compliance with the requirements of Subpart S of this Part.

#### Appendix B to § 1910.270

Other OSHA Regulations and General Industry Standards which may be applicable to the Oil and Gas Well Drilling and Servicing Industry are:

Part 1903 Inspections, Citations and Proposed Penalties

Part 1904 General and Reporting Occupational Injuries and Illnesses

Part 1910 General Industry standards

Subpart C This subpart deals with Employee Exposure Records.

Subpart D This subpart deals with Guarding Floor and Wall Openings and Holes, Portable Wood and Metal Ladders, Fixed Ladders, Scaffolding and other Walking-Working Surfaces.

Subpart E This subpart deals with Means of Egress, Emergency Plans and Fire Prevention Plans.

Subpart G This subpart deals with Occupational Health and Environmental Control Issues such as Ventilation, Noise and Radiation.

**Note.**—Section 1910.95 items (c) through (p) do not apply.

Subpart H This subpart deals with Hazardous Materials such as Compressed Gases, Acetylene, Flammable and Combustible Liquids. Under this subpart the following sections may apply:

§ 1910.101  
§ 1910.102(a)  
§ 1910.106 (a) through (e)  
§ 1910.109  
§ 1910.110

Subpart I This subpart deals with Eye and Face Protection, Respiratory Protection, Head Protection and other types of Personal Protective Equipment.

Subpart J This subpart deals with General Environmental Controls such as Sanitation. Under this subpart the following sections may apply:

§ 1910.141  
§ 1910.142  
§ 1910.145

Subpart K This subpart deals with Medical Services and First Aid.

Subpart L This subpart deals with Fire Protection Issues. Under this subpart the following sections may apply:

§ 1910.157  
§ 1910.165

Subpart M This subpart deals with Compressed Gas and Compressed Air Equipment. Under this subpart the following section may apply:

§ 1910.169

Subpart N This subpart deals with Materials Handling and Storage. Under this subpart the following sections may apply:

§ 1910.176 (a), (b), (c) and (g)  
§ 1910.179  
§ 1910.180  
§ 1910.183  
§ 1910.184

Subpart O This subpart deals with Machinery and Machine Guarding. Under this subpart the following sections may apply:

§ 1910.211  
§ 1910.212  
§ 1910.215  
§ 1910.219

Subpart P This subpart deals with Hand and Portable Power Tools and other Hand-Held Equipment and Guarding Requirements for these Tools and Equipment.

Subpart Q This subpart deals with Welding, Cutting and Brazing.

Subpart S This subpart deals with Electrical Systems and Equipment.

Subpart T This subpart deals with Commercial Diving Operations.

Subpart Z This subpart deals with Toxic and Hazardous Substances.

#### Appendix C to § 1910.270

##### *Oil and Gas Well Drilling and Servicing References*

*General References.* The following references provide information which can be helpful in better understanding the requirements contained in § 1910.270.

1. A Primer of Oilwell Drilling; Petroleum Extension Service, The University of Texas at Austin, Texas 78758.

2. A Primer of Oilwell Service and Workover; Petroleum Extension Service, The University of Texas at Austin, Texas 78758.

3. Comprehensive Safety Recommendations Land-Based Oil and Gas Well Drilling; National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, Morgantown, West Virginia 26505.

4. Recommended Practices for Occupational Safety and Health for Oil and Gas Well Drilling and Servicing Operations, API RP-54 American Petroleum Institute, 300 Corrigan Tower, Dallas, Texas 75201.

5. Recommended Safe Procedures and Guidelines for Oil and Gas Well Servicing; Association of Oil Well Servicing Contractors, 6060 North Central Expressway, Suite 538, Dallas, Texas 75206.

6. Drilling Manual; International Association of Drilling Contractors, 3737 Westcenter Drive, Houston, Texas 77042.

7. Blowout Prevention; Louisiana State University, Baton Rouge, Louisiana 70803.

8. Safety and Health for Oil and Gas Well Operations; U.S. Department of Labor, OSHA, Washington, D.C. 20210.

9. Health and Safety Guide for Oil and Gas Well Drilling and Servicing; National Institute for Occupational Safety and Health, Publication No. 78-190, Cincinnati, Ohio 45226.

10. Drilling Technology Series; Petroleum Extension Service, The University of Texas at Austin, Texas 78712.

11. Lessons in Rotary Drilling; Petroleum Extension Service, The University of Texas at Austin, Texas 78712.

12. Lessons in Well Servicing and Workover; Petroleum Extension Service, The University of Texas at Austin, Texas 78712.

13. NIOSH/OSHA Pocket Guide to Chemical Hazards; National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, Publication 78-210, Cincinnati, Ohio 54226.

14. Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes for 1982; American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio 45201.

15. American National Standard for Emergency Eyewash and Shower Equipment; (ANSI Z358.1-1981), 1430 Broadway, New York, New York 10018.

16. OSHA Instruction STD 1-12.28, CH-1, Dated February 14, 1983, Occupational Safety and Health Administration, U.S. Department of Labor, Washington, D.C. 20210.

##### *State Standards*

*Alaska—Subchapter 8, Petroleum Code Occupational Safety and Health Standards,* Alaska Department of Labor, Division of



Occupational Safety and Health, Juneau, Alaska 99811.

*California—Petroleum Safety Orders Drilling and Production*, California Department of Industrial Relations, Division of Occupational Safety and Health, 525 Golden Gate Avenue, 3rd Floor, San Francisco, California 94102.

*Michigan—Oil and Gas Drilling and Servicing Operation*, Department of Labor, 309 West Washington, Box 30015, Lansing, Michigan 48909.

*New Mexico—Recommended Practices for Oil and Gas Well Drilling and Servicing Operations*, 1982. Environmental Improvement Division, P.O. Box 968, Santa Fe, New Mexico, 87504.

*Texas—Draft Occupational Safety Standard for Oil and Gas Well Drilling and Servicing*, Texas State Department of Health and Resources, 1100 West 49th Street, Austin, Texas 78758.

*Utah—Rules and Regulations for Oil, Gas, Geothermal and Related Services Standards*, Utah State Industrial Commission, 160 East South, P.O. Box 5800, Salt Lake City, Utah 84110-5800.

*Wyoming—Rules and Regulations for Oil and Gas Well Servicing*, Wyoming Department of Occupational Safety and Health, 200 East 8th Avenue, Cheyenne, Wyoming 82001.

*Wyoming—Rules and Regulations for Oil and Gas Well Drilling*, Wyoming Department of Occupational Safety and Health, 200 East 8th Avenue, Cheyenne, Wyoming 82001.

#### Appendix D to § 1910.270

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