APPENDIX A

CONDITIONS WHICH RESTRICT OR DISQUALIFY AN INDIVIDUAL FOR DIVING AND EXPOSURE TO HYPERBARIC CONDITIONS

The following disorders are considered as a basis for absolute disqualification for occupational exposure to diving or hyperbaric conditions:

- Epileptiform disease.
- Chronic inability to equalize sinus and/or middle ear spaces.
- Cystic, obstructive, cavitary, or restrictive disease of the lungs.
- Seriously impaired pulmonary function.
- Significant central nervous system disease.
- Cardiac abnormalities (e.g. pathological heart block, valvular disease, intraventricular conduction defects other than isolated right bundle branch block, angina pectoris, arrhythmia, coronary artery disease).
- Malignancies (active) unless treated and without recurrence for five years.
- Psychotic disorders.
- Chronic alcoholism.
- Drug addiction.
- Significant hemoglobinopathies

The following conditions or disorders may restrict, limit, or disqualify an individual for occupational exposure to hyperbaric conditions depending upon severity, presence of residual effects, response to therapy, number of occurrences, diving mode, or degree or duration of isolation:

- Diabetes.
- Obesity.
- History of serious neurological decompression sickness.
- Conditions requiring continuous medication for control.
- Frequent fainting spells.
- Peptic ulcer disease.
- Visual acuity deficits.
- History of seizure disorder other than early febrile convulsions.
- Pregnancy.
The following conditions or disorders may be a basis for temporary restriction or disqualification from occupational diving or exposure to hyperbaric conditions:

- Acute alcoholism and/or drug intoxication.
- Acute gastrointestinal syndrome.
- Acute infections (e.g. skin, upper respiratory, ear).
- Recent incident of decompression sickness or pulmonary barotrauma.
- Perforated tympanic membrane.
APPENDIX B

COMMERCIAL DIVING OPERATIONS

OCCUPATIONAL SAFETY AND HEALTH REQUIREMENTS

PART 1910 of Title 29 of
the Code of Federal Regulations,
Subpart T
DEPARTMENT OF LABOR

Occupational Safety and Health Administration

COMMERCIAL DIVING OPERATIONS

Occupational Safety and Health Requirements
RULES AND REGULATIONS

This 29—Labor
CHAPTER XVII—OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, DEPARTMENT OF LABOR

COMMERCIAL FISHING OPERATIONS

Occupational Safety and Health Requirements

AGENCY: Occupational Safety and Health Administration, Department of Labor.

ACTION: Final standard.

SUMMARY: This final standard establishes mandatory occupational safety and health requirements for commercial diving operations. It reflects OSHA's determination, based on evidence that has been placed in the public record of this rulemaking proceeding, that special diving operations involve significant hazards to employers necessitating Federal regulation. By this final standard the Occupational Safety and Health Administration has established safety and health standards for personal and medical requirements, operations procedures, equipment, procedures and requirements, and recordkeeping.


FOR FURTHER INFORMATION CONTACT:


SUPPLEMENTARY INFORMATION:

I. PRELIMINARY HISTORY

On August 8, 1975, a petition by the United Brotherhood of Carpenters and Joiners of America, AFL-CIO, was presented to the Secretary of Labor, stating the petitioner's belief that a situation of grave danger existed within the diving industry and urging that an emergency temporary standard (ETS) be issued with regard to diving operations to protect exposed employees. An informal fact-finding hearing was convened by OSHA in Washington, D.C., November 11-14, 1975. Based on the evidence gathered and evidence obtained by OSHA, with the assistance of an inter-agency federal task force and several independent experts, the Assistant Secretary of Labor for Occupational Safety and Health determined, in accordance with section 6(c) of the Act, that an ETS was appropriate to protect employees engaged in commercial diving from occupational exposure to grave danger.

On June 15, 1976, the Assistant Secretary of Labor for Occupational Safety and Health (14 FR 24272) as subpart T of 29 CFR Part 1910, 1910.414 et seq., pursuant to sections 6(c) and 11(c) of the Act, Secretary of Labor's Order No. 5-76, and 29 CFR Part 1911. The evidence and findings supporting issuance of the ETS and a discussion of the provisions are set forth at 41 FR 24372-24385.

The ETS was to be effective on July 15, 1976. However, following a temporary stay, the U.S. Court of Appeals for the Fifth Circuit issued an indefinite stay of the ETS on August 11 pending a final decision on a suit filed by several diving contractors challenging the validity of the agency's action. Taylor Diving and Salvage Co., Inc. et al v. U.S. Department of Labor, Civil Action No. 16-2886 (C.A. 3, 1976). Pursuant to the Court's order, the OSHA was not required to enforce the ETS. For reasons stated in the Federal Register notice published on November 8, 1976 (41 FR 48992), the ETS was withdrawn. As a result, the Court dismissed the suit on the ground that the issues raised by the case were moot.

In formulating the proposed permanent

The OSHA revisited the underlying evidence and the substantive provisions of the ETS in conjunction with information made available to the agency subsequent to publication of the ETS. In this second technical support was provided by individuals from the U.S. Coast Guard, the U.S. Navy, the National Institute of Occupational Safety and Health (NIOSH) of the Department of Health, Education, and Welfare, the National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce, and the Smithsonian Institution.

Because as many diving operations are closely associated with, or related to, construction activities, OSHA considered it appropriate prior to formulation of a permanent standard to assess the evidence and recommendations of the agency's Advisory Committee on Construction Safety and Health (the Advisory Committee), established under the Contract Safety Act. This activity was taken pursuant to 29 CFR 1910.10 and 29 CFR 1922.4. All materials available were presented to the Advisory Committee. In August 1976, the Advisory Committee reviewed the materials and issued its recommendations to OSHA. The Advisory Committee considered the provisions of the ETS and the ground materials contemplated for inclusion in the new proposal. On August 26, 1976, the Advisory Committee received and evaluated OSHA's draft technical recommendations to OSHA at that time. In developing the proposed permanent standard, OSHA considered all the recommendations of the Advisory Committee.

The proposed permanent standard and notice of hearings was published in the Federal Register on November 5, 1976 (41 FR 36008) with a necessary correction made on November 12, 1976 (41 FR 50008). A similar notice of hearing was issued by the U.S. Coast Guard on the same date (41 FR 48992). Public hearings on the proposal were held with the joint participation of the U.S. Coast Guard in New Orleans, La., on December 16-21, 1976, and January 10-14, 1977. A total of eighty-one individuals appeared at the hearings as witnesses. Among the witnesses were offshore and shallow water commercial diving contractors, large corporate and small business employers, representatives from the affected workforce including divers, supervisory and support personnel, diving instructors, marine scientists, experts in hyperbaric medicine, diving physiologists, equipment specialists, and other interested parties. Public listening sessions were conducted conjointly with sessions conducted on the rulemaking record. The hearing record was originally scheduled to close on January 31, 1977, but at the request of several parties, it was kept open to February 28, 1977. Before the close of the record, OSHA met with each of the major parties represented at the hearings for the purpose of suggesting issues to be addressed in their respective written post-hearing comments.

This final standard is based on a careful consideration of the entire record in this proceeding, including materials submitted for the fact-finding hearing, materials relied on in the ETS, information submitted to and recommendations of the Advisory Committee, materials referenced in the proposal, and the record of the informal rulemaking hearing including public comments, exhibits, comments, and notices received. Copies of the official list of hearing exhibits, comments, and notices received are available at the hearing room, 3801 East Capital Street, N.W., Washington, D.C. 20210 (202)523-7052. Hearing room exhibits or comment numbers which appear in the hearing transcript may be obtained by writing to the Division of Public Affairs, OSHA, 3801 East Capital Street, N.W., Washington, D.C. 20210 (202)523-7052.

II. NATURE OF THE DIVING INDUSTRY

Commercial divers perform a variety of undersea tasks and are engaged in diving throughout the country's coastal waters, the Outer Continental Shelf, in many of the nation's rivers and inland lakes, as well as in artificial and industrial waters. A March 1970 analysis made by NOAA indicated that there were approximately 2,300 commercial divers in the United States as of January 1973. The NOAA study estimated the diver population in the Gulf of Mexico alone to be 505 full-time and 450 part-time divers (ETS Ex. 12). Under the growing use of the commercial diving industry is such that approximately 90 percent of all offshore operations are conducted by 23 contractors who account for over half of the country's commercial divers. In addition, there are approximately 4,500 commercial diving companies, whose work is principally confined to relatively shallow waters in harbors and inland waterways.

Prior to 1960 almost all commercial diving in the United States was con-
RULERS AND REGULATIONS

37651

duced in harbors and inland waterways, and conducted maintenance, repair and salvage work. However, with

in the past fifteen years, in conjunction with the national effort to use more of the mineral resources, new areas located in coastal waters and further offshore areas have been opened for exploration and development. Divers are utilized exten-
sively in the oil industry—exploration, construction, and production.

While the majority of inland and harbor diving occurs at depths less than 100 feet of seawater or fresh water, the diving depths work at depths which range from very shallow to 3000 fsw or more, and occasion-

ally to 5000-10000 fsw. Technology is sufficiently advanced to enable diving to depths approaching 10,000 fsw. Based on the current trend in offshore of exploration, deeper and longer working dives can be anticipated.

III. The Diver’s Work Environment

Divers are called upon to use their skills in activities such as construction, repair, salvage, scientific observation, inspec-
tion, pipe laying, and rescue opera-
tions.

Commercial diving involves exposure to a high degree of risk. The diver’s work environment is highly critical. Many divers are subjected to the dangers commonly associated with maritime and construction work. Their work often in-
volves such operations as welding and the manipulation of heavy objects. In addi-
tion, many times they work in isolation for relatively long periods of time and are exposed to the hazards of injury and illness.

In diving, several techniques and modes are utilized. Their appropriateness

for any particular situation depends on a variety of factors, including the depth, time, nature of the operation to be per-
formed, and the experience and technical capabilities of the persons involved.

Each has unique operational advantages and disadvantages.

SCUBA diving, where the diver carries their own breathing gas supply, is used primarily for inspection and search activities. Diver-investor mobility and ease of operation are its principal assets. How-

ever, the possibility of the diver’s getting lost in relation to the dive location (i.e., the vessel or surface from which the dive

is conducted), the limited breathing gas supply, and the usual absence of voice communications limit the usefulness of

SCUBA in commercial activities and pose hazards which can largely be avoided by using the surface-supplied mode.

Surface-supplied diving is more commo-

n than SCUBA diving for commercial operations. This method involves supply-

ing the diver with breathing gas, either air or mixed gas, through a hose, from a source located at the dive site.

This method of supplying the diver with life support allows manipula-
tion of the diver, who is tethered and in communication with dive location. A

major safety limitation of this mode is the duration of investor exposure. The diver working in the water is continu-

ously subjected to temperatures, currents and other adverse factors of the

work environment. If a diver is decompressed in the water, these factors are intensified by the additional exposure to be exposed by this procedure.

When a dive is particularly deep or lengthy, there is a potential for the use of a diving bell appropriate. A diver-

ing bell is a device which allows the diver to be transported to and from the underwater worksite in an enclosed, dry

compartment. It may be authorization (closed), or it may be unpressurized (open). With a bell, the diver, when

and when the bell has a minor life support or life support bundle but if surface

supplied, is closer to a place of refuge, and can be decompressed in the relative safety of an enclosed environment.

Mixed gas diving is carried out with mixtures of oxygen and gases such as helium and/or nitrogen; an oxygen-

healing (heliox) mixture is most com-

monly used. Mixed gas replaces air as the breathing gas is supplied from the surface and is used in conjunction with surface-supplied bell and saturation diving.

Diving accidents, in which the body tissues become saturated with inert gas, is used in situations where the diver will

be exposed to hyperbaric (or high pres-

sure) underwater conditions for long pe-

riods of time. For example, if the diver dives to a depth of 400 feet with working times of over two hours, saturation diving may be required. The advantage of satu-

ration diving is that once the diver’s body is saturated, with inert gas at any given depth, no addi-
tional decompression time is re-

quired. However, the saturation mode usually involves very long periods of decompression and isolation for the affected divers.

This can be physiologi-

ically and, in some cases, psychologi-

cally draining.

Liveboating is a technique in which a vessel is used as a live well for a diver or a vehicle which is underway. This gives the diver the ability to move from point to point without conducting the diver through this technique, but is also possible if the diver were

either gas in uncontrolled or on a surface structure. Because the vessel is underway, however, liveboating poses the potential hazard of boat entanglement in the turn-

ing propellers.

Whether the diving technique or mode used, divers must rely completely on ex-

ternal life-support systems while work-

ing. Of course, factors such as environmental, psychological, physical, or medical limitations or processes must be carefully considered and appropriate measures taken to ensure the diver’s safety. A close working relationship between the diver and surface support personnel must be established, and an experienced, trained person must be present and in charge of each diving operation.

The dive team must be trained or experienced in the diving mode to which it is assigned, and the use of the tools necessary to perform its work. This is universally true of divers, because many of the work tasks they perform underwater, such as burn-

ing, welding, and cutting, can be dangerous or even lethal unless they are done properly.

In addition, divers are often exposed to changes in temperature, weather conditions, underwater visibility or currents, and are exposed to an environment which may include the presence of harmful substances, infectious organisms, or toxic gases. Divers are also subject to the hazards of working in a confined space, the possible presence of electrical hazards, and the potential for exposure to extreme cold or heat.

Proper training, planning for emergencies and development of appropriate contingency plans are essential to the safety of all divers. Proper planning, training, and procedures for handling emergencies are necessary to ensure the safety of all divers. Proper planning, training, and procedures for handling emergencies are necessary to ensure the safety of all divers. Proper planning, training, and procedures for handling emergencies are necessary to ensure the safety of all divers.
be readily available to treat this condition effectively.

The contribution of comprehensive medical and engineering safety is not limited to emergency or contingency situations; many types of communications are vital to safe diving. Whether used to warn other vessels in the area, to ensure normal breathing gas flow, to summon emergency aid, or to coordinate operations between the diver and the dive location or bell, reliable two-way communication is essential.

The result in the case of diving operation is also critical. It must be in proper operating condition and carefully inspected prior to use in diving operations. For example, compressors must be well maintained and located away from sources of contamination locations. The safety implications of equipment failure or misuse for the diver warrant the greatest attention to equipment condition and suitability.

IV. PHYSIOLOGICAL HAZARDS

Divers are particularly, and in some cases uniquely, exposed to certain kinds of physiological hazards. On any dive, a diver is exposed to such potentially harmful physical agents as pressure, breathing gas, and water. One variable is the element of depth. Increased depth means an increase in the pressure exerted on the diver's body. At an environment pressure of 1 atmosphere (14.7 pounds per square inch) for every 33 feet of depth. While every increase in pressure does not necessarily cause a proportionately greater physiological risk, the altitude hazards are inherently pressure-related.

In a hyperbaric environment, the increased pressure of the breathing gas forces more gas to be dissolved in the blood and reduces the rate of the oxygen's release from the blood. Blood pressure, which results in the form of bubbles, which are the cause of decompression sickness or diving-related disoders, either directly or indirectly. The probability of these decompression sickness or diving-related disoders decreases with the ascent of the diver.

The term decompression sickness is applied to a disease which may occur as the result of a reduction in ambient pressure. The symptoms vary from mild local pain or itching of the skin to neurological effects or collapse with unconsciousness. Decompression sickness symptoms usually occur shortly after reaching the surface from deep dives. Decompression sickness is a serious disease which is not easily treated. This condition is known as baroconiosis or barotrauma. If the pressure at the depth of decompression sickness may involve permanent or residual damage to the central nervous system (CNS) or to the audio-vestibular system. Decompression sickness involving the audio-vestibular system may be manifested as partial or total hearing loss, a ringing in the ears, or a sudden severe dizziness or vertigo. The pressure of decompression sickness occurs more often during decompression from very deep dives. Among the symptoms indicating possible CNS involvement are numbness, dizziness, nausea and vomiting, weakness, abdominal pain, visual disturbances, speech difficulty, shock and unconsciousness.

As with using ultrasonic monitoring during decompression has produced convincing evidence that some bubbles may exist during most decompressions, even in the absence of overt symptoms and in the presence of decompression sickness. These bubbles may damage the linings of the blood vessels and cause changes in the blood flow. The bubbles may also cause other subtle physiological effects on various organs and the body.

Divers as a class are also subjected to increased risk of skeletal damage. There is some evidence that this damage, known as dysbaric osteoarthritis, is decompression-related, the result of gas bubbles trapped in bone tissue which cause the death of such tissue. Dysbaric osteoarthritis may appear as a benign lesion of a long bone, but a lesion situated critically at or near a joint may cause structural failure, which results in painful limitation of movement and eventual loss of joint action.

Divers are subject to other decompression-related medical problems. An example of this is stomal gum, the result of being forced into the bloodstream, which is usually caused by a diver holding the breath while ascending. This gas acts as an obstruction, or embolus, which blocks the passage of blood through the brain or spinal cord. Embolism causes such serious symptoms as weakness, dizziness, visual and hearing disturbances, dizziness, nausea, shock and unconsciousness. The result may be fatal or result in permanent damage unless decompression is accomplished immediately. Similar symptoms may also result from the gas being trapped around the heart and collect in the cavities or in the chest, and may cause collapse of a lung.

Other problems may arise if the pressure in the rigid parts of the body are not equalized. This condition is known as barotrauma or barotrauma. If the pressure imbalance is great enough, ruptured blood vessels or other tissue damage may result. This form of barotrauma most commonly affects the middle ear. But may also occur in the sinuses, teeth, and other organs. The result may be fatal from unequal pressure between the ambient environment and spaces enclosed by the mask or folds of the suit.

In addition to the hazards caused directly by the increased pressure divers are also exposed to a number of hazards because they have been using compressed air or artificial gas mixtures and must rely on special equipment (such as breathing gas, decompression, pressure, vessels, valves, hoses, masks, regulators, and helmets). Among the potential dangers, those associated with oxygen present the greatest hazard in diving. If the partial pressure of oxygen in the breathing mixture is too low, oxygen deficiency (oxybaria) will result. This condition can produce unconsciousness without warning, and can be fatal if not corrected. Excessive oxygen in the breathing gas can cause decompression sickness, or prolonged exposure to relatively lower levels of oxygen may cause lung irritation which increases if exposure continues. In addition, excessive nitrogen in the inspiratory gas can produce narcotic or anesthetic effects which impair the diver's cognitive function.

The possible presence of contaminants in the breathing gas is another hazard associated with diving. Several potentially harmful contaminants have been found in air supplied to divers from engine-driven air compressors. These contaminants can be picked up by a compressor and be produced by the compressor itself. The most significant one is carbon monoxide, which combines with the blood's hemoglobin and interferes with oxygen transport to the tissues. This can result in a depressed cognitive function; if the level of carbon monoxide is high enough, death can result.

V. SUMMARY AND EXPLANATION OF THE STANDARD

The standard applies to all diving operations conducted in connection with all types of work and employment. The standard is not applicable to any employee specifically exempted. Because of the interrelated nature of every diving operation, the standard was designed to take, in its entirety, the many factors that have been developed both nationally and internationally. It is based on the full record of this proceeding, promotes employee safety and health by providing for safe and healthful working conditions so far as is reasonably practicable. The standard is based on the best information available, and is technically correct, and is technologically and economically feasible. The major issues raised in the proceedings as well as the purpose and rationale of each requirement of the standard is addressed in the section-by-section discussion which follows this introduction. No serious question has been raised covering the technical feasibility of the standard, and procedures mandated by the standard.
ard and are known to and used by substan-
tial portions of OSHA in commercial diving
industry today. To the extent that there
will be some deviation from the standard by the
effective date, the difficulty will stem from short-term
industry, of some types of equipment,
and not from any unsatisfactory of the
standard. To a large extent, the satisfac-
tible short-term supply problems have been
remedied by providing delayed ef-
fective date in the standard. Indus-
try is not prepared by professional con-
stantly in the industry. OSHA prepared
within the time and resources avai-
able to it. The rule, as now in
Executive Order No. 11811 (30
FR 4450), November 29, 1974),
OMB Circular A-110 (Rev. 12/74,
the Department of Labor Temporary
Directives No. 1 (November 17, 1975). On
the basis of the comments and the hea-
ings, the rule to conclude that the proposed standard
was not a "major" action warranting in an
feasibility and industry. OSHA was able
to complete the substantial content of the
feasibility and industry. The feasibility
was devoted to the hearing. The propo-
sed standard was so worded as to
be consistent with the opinions of the
industry and the industry associations.
By contrast, the industry economic
resulting in a total annual amount of
compliance to be $43.2 million the
\$40.2 million (TIR 160). It presented no
problem of rule, and will be
adequate to bear the cost, namely
the change in the cost of
in the industry. The
industry associations
were not addressed.

The specific threshold criteria and prop-
erty concluded that they were not ex-
pected. Testing of a non-major inflationary
impact is not necessarily equivalent to
the standard on the regulated industry. In
assessing economic impact, the
standard via a
current and projected industry prac-
tices to test the effect on costs. In
nents proposed on employers which would
otherwise be incurred can be considered.
In making this determination, the
agency must rely on whatever data on
revenues, prices, wages, or structure
exists in the record, as well as
knowledge of current and expected indus-
try practices.

The EIA estimated an annualized
yearly cost of $25.3 million for the
industry, an estimate which was, if any-
thing, an overestimate, in part because it
did not take into account a report by a
major cost. The analysis of the
EIA data, however, was not
understood by as much as 20 per cent.
(TIR 161, 1989), which would place the
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certain capital cost requirements of the standard, the extended effective dates for these requirements should eliminate that potential short-term problem. According to OSHA, the rule is also intended to ensure that the standard is both technically and economically feasible.

In so concluding, OSHA has, of course, also considered the benefits which will accrue from compliance with the standard in the reduction of injuries, illnesses, and fatalities and the accompanying reduction in tangible and intangible social costs. Evidence that deaths, injuries, and illnesses have occurred as a result of the hazards associated with diving is found throughout the records (CEHH Ex. 24, 29, 30, 31, 33, 35, 36, 37). Post Hearing Comments 13, 14, Ex. 17, 63, 75, 106, Comments F, Y, M3): much of the statistical information presented has been compiled in a single document by OSHA (Ex. 44B). While no dollar figure is possible, OSHA believes that the benefits to be derived from the standard far outweigh those of the legislative mandate of the Act.

In addition, OSHA is able to reaffirm its determination (31 FR 49939-19939) that the standard is not a major Federal action significantly affecting the human environment and that an environmental impact statement is therefore not required. The only potential impact that has been raised relates to its effect on the recreational user. The Act found that there would be virtually no impact on either the nation's energy supply or demand, and no impact on supplies of critical materials as a result of the standard (Ex. 27, 14-7, 7). There was testimony by the Industry economic panel that the standard could result in some increase in the cost of production economically feasible and an increase in the mobilization time for the diving industry which would cause pipelines and wells needing repairs to be shut down for longer periods (Ex. 31, 46, 50, 51; ET 187; Ex. 142). However, this assumption fails to take into account the fact that given the size and productivity of the industry compared to the economic costs of lost production, particularly when considered in light of demand for oil and the ability of the oil industry to absorb an increase in the cost of diving services, is such that no significant impact on energy supplies, and hence on the environment can reasonably be anticipated (Ex. 128). It is also noted that the standard permits deviation from the requirement in emergency situations, to the extent necessary to prevent major environmental damage.
of the operation. Once the instructional environment exceeds the specified limits, the standard applies. Coverage of in-
structors who work outside these limits promotes safety, and also serves to introduce proper compliance with the standard at
private safety training.

In addition, it should be noted that individuals engaged in training or carrying out the duties of instructors who work outside these limits are not
excluded from the standard. This exclusion applies only to the instructional limit of 20 hours per year. The standard applies to all training activities, regardless of whether or not
such individuals are engaged in training or carrying out duties of instructors who work outside these limits and who are engaged in training activities.

As in all OSHA standards, the re-
ponsibility for compliance with its require-
ments is placed upon the employer. Throughout the provisions, several in-
cluded provisions are not self-executing; their fulfillment must be
established and cited by the employer.

In the event of violations, OSHA can impose penalties of up to $10,000 per violation.

The OSHA Act provides for civil penalties of up to $100,000 per violation and criminal penalties of up to one year in prison for willful or
repeated violations.

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repeated violations.
in substantial provisions of the standard. For example, "dive local," refers only to the vessel or surface from which the diving operation is conducted, and not to the underwater activities of the dive. Certain definitions which changed in the propser have been deleted because they were considered identical to their common, unambiguous meanings within "pneumatics," "exhaust valve;" others have been deleted because their interpretation is nowhere stated in the standard (e.g., "acemoset time;" "hot tapping;" "PVHO"). Of the definitions which remain, multiple, broad, sometimes inward and in accord with testimony and comments received in connection with the hearing on the proposal (1994-195, 196-95, 197-3, 198-98, 199); may be trained in. 184, p. 4-9, 185, 178, p. 17-22).

3. Personnel qualifications (1918-1994). In the diving industry, terms such as "qualifications" are critical to safety and health since lack of adequate training and experience has been one of the most frequent contributing causes to diving accidents and injuries (1978-3, 193, 201-23, 1914, 2200; Ex. 17, 44, 62, 70, 173, 174). Employee safety and health can be maximized by establishing basic criteria for experience and training of participants in the diving industry, including the designated person-in-charge. "Training" refers to the use of tools, equipment, systems, techniques, operations and emergency procedures required to permit the individual to perform the assigned tasks and diving modes, i.e., SCUBA, saturation dives, and the like. These required elements of experience or training are essentially unsubstantiated, not supported by evidence, and not supported by testimony (Ex. 134). In addition, dive team members who are exposed to or control the exposure of others, to hyperbaric conditions (e.g., a chamber operator), may require training in diving-related physics and physiology. Training in diving-related physics was specifically included in the proposal submitted by Chesapeake Medical Technicians (1978-3). An American Red Cross standard course (19 hours or equivalent) is considered to be a basic understanding of the knowledge of the diving operation. However, under the standard's formulation, for example, a beginning or advanced dive team member who is not exposed to hyperbaric conditions nor responsible for the exposure of others will not be required to have this training.

The level of experience or training required by the standard depends upon the particular function to which the employee is assigned. For example, a tender employed in shallow air diving would be required to have a basic understanding of the breathing air system and the operation of procedures which pertain to this mode and the equipment associated with it. A microphone, a by contract, would be required to have a greater degree of understanding, including a working knowledge of diving equipment, such as a decompression chamber, bell, and mixedgas breathing gas supply system, as part of the emergency operation procedures associated with this diving mode. This course will cover the handling of the equipment and physiology of mixed gases. By allowing examination for certification to be achieved through either field experience and or classroom instruction or a combination of both, the standard acknowledges industry practice, which is to train dive team members, including those who are graduates of formal diving courses. Most dive begins as tenders and advance to dive status after a year or more of field experience (Ex. 706, Ex. 711, Ex. 134, p. 10-19).

In addition, each dive team member must be trained in cardiopulmonary resuscitation and basic first aid. This requirement replaces the proposal's reclassification as a consequence of divorce, the implementation of a (Burn/D) requirement in both inappropriate. The standard may offer an alternative method of gaining necessary first aid knowledge and skills. The certification is considered to be a basic understanding of the knowledge of the diving operation. However, under the standard's formulation, for example, a beginning or advanced dive team member who is not exposed to hyperbaric conditions nor responsible for the exposure of others will not be required to have this training.

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RULING

is basically a high-stress occupation performed under difficult environmental conditions, and that the safety of the diver and other dive team members can depend on the health of the individual diver. For this reason, OSHA requires formal medical examinations for employees in this occupation who are, or are likely to be, exposed to hyperbaric conditions. In addition, the requirement for medical examinations is included in section 6(b)(7) of the Act to determine whether the health of such employee is adversely affected by this occupational exposure.

As in the proposal, the employer is ultimately responsible for determining whether affected dive team members are medically fit to perform assigned tasks in a safe and healthful manner. However, the decision is to be based on the available medical opinion.

For the employer to have sufficient information on which to base such medical examination, the standard requires the employer to provide dive team members who are, or are likely to be, exposed to hyperbaric conditions with medical examinations at no cost to the employee. The proposal required examinations for "employees engaged as divers or otherwise subjected to hyperbaric conditions." It has been recommended to OSHA that only divers be provided with the required examinations, a recommendation which would exclude all non-diving support employee from the medical examination requirement. (Ex. 178, pp. 33-34, 30-1.) However, the standard as written reflects the view, expressed by a commercial diving physician at the hearings (Ty. 71), that any dive team member who is to be exposed to hyperbaric conditions should be medically fit beforehand. Being subjected to pressure and the associated decompression stress is stressful which warrant inclusion of this group of employees in the medical requirements of the standard. For the purposes of the standard, "are, or is likely to be, subjected to hyperbaric conditions" should be interpreted to mean that the employee who is expected to dive, enter a decompression chamber, or be otherwise exposed to increased pressure. In addition to divers, this requirement would apply, for example, to dive team members who are tenders or designated persons-in-charge who might reasonably be expected to enter a decompression chamber to treat, or aid in the treatment of, a diver suffering from decompression sickness.

"Objection has been raised to the requirement that employees bear the cost of the examinations, particularly when providing an examination for transient divers hired on a temporary basis for specific jobs. Nevertheless any employer exposing employees to hyperbaric conditions, except in emergency situations, must be prepared to pay for their medical examinations unless it can be demonstrated that an equivalent medical examination were taken within the preceding 13 months. (Ty. 71, 72, 96; Ex. 178, p. 30.) The cost of medical examinations being borne by the employer is mandated by statute (§ 6(b)(7) of the Act) and reflects a purpose that the medical fitness of all employees is the responsibility of the employer.

There was considerable testimony from experts in divers' familiarity and knowledge of diving medicine (Ty. 125, 178, 1011, 1391, 1459), and the employer believes such knowledge is essential. Accordingly, it is expected that employers who have had an examination of their employees who are or will be exposed to hyperbaric exposure and types of assigned work. However, no specific qualifications for the training of physicians performing the required medical examinations are prescribed, because this is a newly recognized sub-speciality of hyperbaric medicine at this time.

The requirement that medical examinations be provided at one-year intervals from the date of the initial or last equivalent examination reflects standard medical practice (Ty. 70). Since there will be a 90 day effective date for the standard, OSHA believes there will be adequate time to provide the required examination. (Comment Y.) Employees hired after the effective date of this standard should be provided the examination before being assigned to tasks requiring hyperbaric exposure so that the determination of fitness can be made before assignment.

As in the proposal, the standard permits an employee who has had an examination within the preceding year which is equivalent to the one required by the standard to be examined for any change in condition. This will avoid unnecessary medical examinations.

The reexamination requirement after an injury or illness appeared in the proposal as a separate condition, but the creation of such a condition was not necessary. The reexamination is necessary has been modified in accordance with testimony presented by physicians (Ty. 78-79, 136). The testimony recommended that hose physicians be consulted. Table 9 of the proposal is protected and proper and adequate, since it reflects the current medical practice which requires patients to be hospitalized for observation for a 24-hour period in cases where the seriousness of symptoms or signs is not determined. After the observation period, those patients whose conditions warrant hospitalization are admitted, while those whose injuries of illnesses have resolved or are clearly minor in nature are discharged. The standard therefore requires reexamination only for the group of employees whose conditions are medically judged to warrant such hospital admission, and further provides that the nature and extent of such reexamination be determined by the examining physician. After the second reexamination, an employee cannot be re-assigned until the employee is fit to return to the assigned work based upon the physician's report.

The requirement that the employer provide the physician with certain basic information derived from a Physician's report in the proposal, as modified by testimony (Ty. 136) is consistent with general OSHA policy. The examining physician must be supplied with a copy of the report, and the information is required to be maintained. In addition, the employer must provide the physician with a summary and a copy of the nature and extent of the hyperbaric conditions to which the dive or work provision has been made. In the instance, such a statement might indicate that a chamber attendant will be exposed to a pressure equivalent to 165 feet (GATA), but would not be exposed to the underwater work environment of the physician. The physician must also be told by the employer what modes of diving and what types of work the diver will be performing. Such a description might note that the employee will be diving in the saturation mode, where the physician may be exposed for prolonged periods to stressful and isolated hyperbaric conditions. Therefore, an employee exposure to the conditions described in the work environment.

Each initial and annual examination must include a medical history, a diving-related work history, a basic physical examination, the tests required in Table 9, and any additional tests the physician considers necessary. In contrast to the proposal, diving-related work history is limited to diving-related matters, because other details of work history would not be relevant except to the extent they have become a part of the medical history of the employee. The requirement for "any tests deemed necessary to establish the presence or absence of any . . . conditions" has been deleted. This was done because the intent of the proposal was to require the physician discretion to administer other tests deemed necessary by sound medical practice, because the absence of a condition cannot be determined by the examination.

The required medical tests which appear in Table 9 are basic examination requirements and are somewhat modified from the proposal. The ESCG (Standard 212) identifies certain cardiac abnormalities not permissible for diving physicians (Ty. 82). A hearing test is essential because hearing degradation is a serious problem for divers (Ty. 83). Blood pressure and urine tests are important because an elevated blood pressure or proteinuria of any urine tests can only be detected this way. Diabetes can produce unconsciousness; asthenia reduces work capacity and therefore fa-
RULES AND REGULATIONS

tigue and exhaustion (Try. 66). A white blood cell count is indicated in all cases. The sickle cell test is not used for mass screening. Abnormal hemoglobin production may indicate an underlying condition such as diabetes or renal failure. Knowledge of the possible complications of a white blood cell count must be acquired through the use of a hemoglobin A test. The sickle cell test is not used for mass screening. Abnormal hemoglobin production may indicate an underlying condition such as diabetes or renal failure. Knowledge of the possible complications of a white blood cell count must be acquired through the use of a hemoglobin A test.

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amendments or limitations for a particular condition or inhibit the practicability of a particular physical condition and included in the appendix should be causes for prohibiting or limiting further hypobaric exposure by the employee. The standard requires other amendments or limitations be reasonably related to the nature and extent of exposure to hypobaric conditions.


The requirement that a safe practices manual be developed and maintained is similar to a comparable provision in the proposal. In this case, the importance of such a document is to provide a more specific and comprehensive set of guidelines and procedures for implementing the requirements of the OSHA standard. This manual must include and makes clear that the purpose of the manual is to contain the employer’s policies for implementing the requirements of the OSHA standard. This manual shall include information and guidance for compliance with the standard, and shall be provided to all employees. The manual shall be updated as necessary. The manual shall be reviewed and updated on a regular basis.

The reference document is 3102.220,

The safe practices manual must also be available for on-site inspection. The employer shall ensure that the safe practices manual is available for inspection and is located in a readily accessible location. The manual shall be kept current. The manual shall be updated as necessary.

6. Pre- and post-entry procedures (1926.220).

The requirement to develop and maintain a safe practices manual is similar to a comparable provision in the proposal. In this case, the importance of such a document is to provide a more specific and comprehensive set of guidelines and procedures for implementing the requirements of the OSHA standard. This manual must include and makes clear that the purpose of the manual is to contain the employer’s policies for implementing the requirements of the OSHA standard. This manual shall include information and guidance for compliance with the standard, and shall be provided to all employees. The manual shall be updated as necessary. The manual shall be reviewed and updated on a regular basis.

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may in fact be preferable to a written dive plan in many cases because of the greater opportunity afforded for group discussion and to accommodate the change. In conjunction with this requirement, the two pre-dive practices manual which is a written document an hopeless, applicable to all diving operations is to be available to all dive team members at the dive location.

The equipment inspection requirement prior to each dive derives from a comparable provision in the proposal and reflects the need to ensure that the equipment is in correct condition. The list of items to be included in the check list which requires visual inspection will vary depending on the specific dive. The standard's inspection requirement recognizes the need for a thorough check of critical items. However, this list is not intended to be all inclusive. For example, the use of equipment included in the check list which requires visual inspection will vary depending on the dive and the individual diver's policies. The issue was raised at the meetings concerning employee-provided versus employee-owned equipment and the question of whether the diver or designated person inspects the equipment. The required pre-dive equipment inspection (TR. 11, 1223-2, 1224, 1794-5, 1798-9, 2159) has been deleted from the latest draft of the standard. The inspection requirement now requires the diver to inspect the equipment before each dive (TR. 125, 1270). The proposal also requires the diver to inspect the equipment on a daily basis when not in use (TR. 125, 1270).}

The requirement for water entry and exit is similar to that of the existing standard. Apart from the fact that the existing standard requires the diver to enter and exit the water from a ladder, the standard's requirement is the same as the proposed requirement. The proposed requirement is intended to cover all types of diving operations, including those that involve the use of a diving bell. The proposed requirement also recognizes the need for a thorough check of critical items. However, this list is not intended to be all inclusive. For example, the use of equipment included in the check list which requires visual inspection will vary depending on the dive and the individual diver's policies. The issue was raised at the meetings concerning employee-provided versus employee-owned equipment and the question of whether the diver or designated person inspects the equipment. The required pre-dive equipment inspection (TR. 11, 1223-2, 1224, 1794-5, 1798-9, 2159) has been deleted from the latest draft of the standard. The inspection requirement now requires the diver to inspect the equipment before each dive (TR. 125, 1270). The proposal also requires the diver to inspect the equipment on a daily basis when not in use (TR. 125, 1270).
precaution against shock became a diver in the water column which diver's flow currents; when a tool is held out of the water by a paracord, the tool may be used for leakage current through the diver's body (Ex. 178, p. 92). For a constant-pressure switch or control on the tool has been deleted in accordance with 178, p. 92. It is not always necessary that these tools be controlled from the dive boat (Ex. 120, p. 66, 231). The constant pressure switch, if it is supplied from the dive location, the level of current is fixed through the current requests that they be turned on. This provision assures that these tools or equipment will not be supplied with power when it is not wanted or the diver is not ready.

The welding and burning requirements are similar to those that appeared in the section on the current supply switch to interrupt the current flow to the welding or burning equipment at other times. The grounding and welding current can be supplied with benefits of insulated cables but it was also pointed out that employers cannot ensure that the diver underwater will wear them (Ex. 199, 2019; Ex. 120, p. 66, 231). The winding, burning, and burning current from the proposal and directed to the possibility of explosion in closed spaces (Ex. 120, p. 66, 231). Insulated cables in hot tapping operations, are flooded by definition and therefore meet this requirement.

The issue of whether or not the standard should provide for the AC welding machine and direct current (DC) rectifiers in underwater welding was raised at the hearings. The NIOSH document (Ex. 123, p. 251) and the National Academy of Sciences Marine Board Report, entitled Underwater Electrical Safety Practices recommend standards for these machines because AC current for AC leak...
chamber or bell/deep diving system, used for the purpose of treatment.

The standard requires a decompression chamber to be lead-free use at the dive location for any dive which is outside the no-decompression limits and deeper than 100 ft. Throughout the standard, the no-decompression limits and 100 ft depth are discussed in relation to decompression chamber design. For this purpose, there is a detailed set of requirements concerning stand-by divers and dive-carried reserves, as well as the requirements for a decompression chamber, based on these limits. "This tiering of the standards reflects a determination that there is an increasing level of hazard associated with dives outside these limits. Decompression dives are deeper or longer than no-decompression dives, and they spill beyond the limits of 100 ft greater exposure times and increase the likelihood of diver fatigue and decompression sickness. These divers also involve greater operational complexity. There is also a relationship between depth and increased hazard. The diver is more frequently exposed to colder water on deep dives and is oxygen and subjected to the added risks of greater pressure and pressure changes. All of these factors contribute to the increased stress associated with depth limitations. Decompression chamber involvement in relation to serious cost outlays and are sometimes cumbersome to transport, but their importance to diver safety is clear (Tr. 869, 817, 1391). Decompression chambers serve two primary functions. First, they provide the only effective therapy—recompression—to prevent decompression sickness and embolism. Second, decompression chambers are used for surface decompression, to reduce the amount of time the diver must be exposed underwater (Tr. 1272). Treatment on the surface is provided as the chamber must be prepared to leave the dive location in the event that the diver requires a decompression chamber. decompression chamber is prepared to set up one of its four chamber pressure levels and treat the diver. A decompression chamber for a decompression chamber to be lead-free use at the dive location for any dive which is outside the no-decompression limits and deeper than 100 ft. Throughout the standard, the no-decompression limits and 100 ft depth are discussed in relation to decompression chamber design. For this purpose, there is a detailed set of requirements concerning stand-by divers and dive-carried reserves, as well as the requirements for a decompression chamber, based on these limits. "This tiering of the standards reflects a determination that there is an increasing level of hazard associated with dives outside these limits. Decompression dives are deeper or longer than no-decompression dives, and they spill beyond the limits of 100 ft greater exposure times and increase the likelihood of diver fatigue and decompression sickness. These divers also involve greater operational complexity. There is also a relationship between depth and increased hazard. The diver is more frequently exposed to colder water on deep dives and is oxygen and subjected to the added risks of greater pressure and pressure changes. All of these factors contribute to the increased stress associated with depth limitations. Decompression chamber involvement in relation to serious cost outlays and are sometimes cumbersome to transport, but their importance to diver safety is clear (Tr. 869, 817, 1391). Decompression chambers serve two primary functions. First, they provide the only effective therapy—recompression—to prevent decompression sickness and embolism. Second, decompression chambers are used for surface decompression, to reduce the amount of time the diver must be exposed underwater (Tr. 1272). Treatment on the surface is provided as the chamber must be prepared to leave the dive location in the event that the diver requires a decompression chamber.
in addition to the depth-time profile has
been included in the list of required in-
formation for divers. The second is the
outside the no-decompression limits, or
using mixed gas to provide a complete
record of the decompression dive informa-
tion (Tr. 1522). The approach which the
standard takes toward reducing the inci-
dence of decompression sickness is based
on assessment of the past perform-
ance of tables and charts, and con-
sequently relies on the availability of
records such as these.

Employees are required to keep accu-
rate records of those decompression dives
in which decompression sickness is sus-
pected. Such records are evidence. These
records are to include the depth and time
of onset and description of decompres-
sion sickness symptoms, and the descrip-
tion and results of treatment. Many com-
pany records keep such records (Tr.
1545-8, 1560-3) and the offshore diving
industry where the impact of this provi-
sion is likely to be greatest generally
requires such a record keeping pro-

gram (Ex. 178, p. 56-6). This requirement is
in addition to the required investiga-
tion, evaluation and appropriate correc-
tive action required in the decompression
procedure assessment section.

The standard's requirements for de-
compression procedure assessment reflect
the testimony and comments received in
connection with the proposal's "de-
compression table assessment" section.
The proposal's experts in the field of decompression indicated that the present state of decompression table development, performance, and verifica-
tion is not sufficiently advanced to war-
rant inclusion of the numerical field perfor-
ance criteria of the type which appeared in the proposal (Tr. 309-303). However, the record does support a pro-
gram of record keeping, investigation and eval-
uation of each such incidence of decompres-
sion sickness, with corrective action to
be taken after the investigation of the in-
cident, to reduce the probability of re-
curring decomposition sickness (CT. 351,
356-7, 179, p. 89-91). Employers may be
considered in the required investiga-
tion are the record keeping, information
that the past performance history of the de-
compression table in question, and the indi-
vidual susceptibility of the diver, since
these would be necessary to any inves-
tigation to determine what corrective
action would be appropriate. The ad-
vantage of record keeping was also part of
the criteria method of the proposal is
that this approach requires every inci-
dent of decompression sickness to be
assessed without waiting for the number
of incidents needed to make a de-
monstrative showing (Tr. 309, 327). Because the performance criteria concept has
been deleted, the need for a decompres-
sion assessment advisory committee, an
issue which the past information con-
cluded at the hearings (Tr. 228, 241), is not being pursued by OSHA
at this time. However, after sufficient ex-
perience with the standard's decompres-
sion assessment provision has been

rised, OSHA will seek to have the data
reviewed and endeavor to return to a rule-
regulatory approach in this area of con-

The decompression procedure assess-
ment section is designed to aid employers
in the evaluation of the field perfor-
ance of their decompression procedures
(Tr. 311, 356). It is believed that such
evaluation will lower the incidence of
such occupational hazard, regardless of
diving mode or current incidents of
eliminating or modifying those tables
whose performance is not adequate and
by revealing other procedures or condi-
tions which may be causing decompres-
sion sickness (Tr. 307). OSHA antici-

pates that this requirement will result in
continuing improvement in decom-
pression tables and procedures so that
divers in the field can be protected to
the extent possible from the hazard of
decompression sickness.

9. SCUBA Diving (1910.241)

The limits for SCUBA diving referred to
is to Industry practice and proce-

dure (Tr. 60-1, 779, 796-7, 851-2, Ex-

p. 30, 178, p. 80-11, and NICORS
and Navy recommendations) (ETB Ex. 6,
4-9, Ex. 150, P. 78-92). As

the limits suggested by the SCUBA
diver from the dive location is considered
favorable to buddy diving (Tr. 128-129).
It is recognized that the latter is an ac-
ccepted practice and is relatively safe in
clear and calm waters, such as should
prevent when there are currents less than
1 knot. The "in continuous visible
facial restriction has been added because
the safety advantage of having two dis-
cerned during the SCUBA diving is lost if this condition is
not fulfilled; without visibility, divers
are not able to stay undersea conveniently
(Tr. 760).

Stationing a diver at the underwater point of entry to an entry or confining
space was a requirement of the proposal
which was endorsed by industry practice
in testimony, and is necessary because of
the increased danger of entanglement or
disorientation when diving in such circum-
stances (Tr. 140, 791, 822). The diver at
the underwater point of entry is required in
addition to any standby diver at the dive
location. Because of the configuration
of the entry, the diver in a physically confining space must be able to rely on
an emergency, particularly since in very
narrow spaces, such a diver may not be
able to carry an independent reserve breath-

The requirement that a diver-carried
reserves be capable of supplying with either
a manual reserve (J valve) or an inde-
pendent emergency cylinder be provided for
each diver allows alternative means of
supply in case the SCUBA diving, even
at the SCUBA diving, modality (Ex. 178,
81). Requiring that the manual reserve or
supply valve on the independent reserve
is necessary in the event prior to
each diver is a safety precaution to as-
sure that the air reserves will be ade-

(Rules and Regulations)
The requirements for an extra breathing gas hose capable of supplying breathing gas to the diver in the water and the availability of the emergency air supply at the dive location when heavy gear is worn for diving, when the diver or the equipment has been lost is by sending a standby diver with a spare hose which is either stowed in a spare-hose locker to attach the spare hose (Tr. 868; Ex. 128, p. 84). Similarly, an inverter also is provided for heavy-gear diving which supplies breathing gas to an emergency air reserve. To be effective, a mixed-gas diving system must have a means to incorporate extra breathing gas for any dive which exceeds the depth and bottom time limits for surface-supplied air diving. This requirement is unchanged from the one in the proposal, and the need for mixed gas at these limits is generally recognized.

A decompression chamber is required for all mixed-gas diving because of the greater likelihood of decompression sickness associated with the deeper dives permitted by this proposal (Tr. 283-4; Ex. 128, p. 76, 228). In addition, scuba gas supply is required for all dives below 230 ft or if the dive is longer than 120 minutes. There is also an exemption where the physical space of the decompression chamber is such that a reserve supply cannot be carried safely.

The requirement for a dive-located supply of breathing gas on a dive for depths deeper than 100 ft or outside the no-decompression limits derives from the reserve breathing gas supply section of the proposal. The supply is intended to support the diver during decompression following a dive. This requirement must be sufficient to support the diver during decompression following a dive. This requirement must be sufficient, however, if this reserve is itself supplemented by an additional reserve supply. This requirement relates with the requirement for a diver-carried reserve breathing gas supply to get the diver to a bell or other underwater place of refuge where he should have to be supplied by the dive-location system (the surface, where the diver may need a decompression chamber supplied by the dive-location system), or to support the diver while awaiting a standby diver (who must be supplied by the dive-location system).

FEDERAL REGISTER, VOL. 42, NO. 141—FRIDAY, JULY 23, 1977
sures, and partial pressures of nitrogen. Testimony at the hearing was opposed to the latter statement. Limits based on mixed-gas diving limits were too conservative (Tr. 81, 647), have not yet been definitively established (Tr. 12, 1484-5; Ex. 175, p. 81), might interfere rather than enhance human performance (Tr. 371), and would prohibit a number of safe and successful procedures (Tr. 317, 647, 1531).

The procedures required for mixed-gas diving are similar to those for single-gas diving in the metal industry. The same rationale supports them, except that no further ventilation of the men is made with regard to the requirements for a separate dive team member to tend each diver, a standby diver, and a dive-location reserve breathing gas supply. This is because the cumberstones of the gear and the fatigue to which mixed-gas divers are subject, an in-water stage is required to be provided for all mixed-gas dive deeper than 100 fsw or outside the non-decompression limits without access to a bell and for all heavy-gear dives regardless of time or depth (Tr. 827). As a general rule, decompression limits based upon gas dives are conducted for times or at depths at which the comparable requirements for a bell or for surface-supplied air divers are made.

In the case of mixed-gas decompression limits, the requirements with regard to the amount of breathing gas that must be available is particularly significant because the mixed-gas supply is fixed in quantity and must be either mixed at the dive location or in a bell. This is because mixed-gas diving with a bell is more likely to be longer and deeper, and the need for decompression sickness is consequently greater. Thus, the method of decompression sickness is to decompress and, when possible, to move the diver to a location where it is possible to transport the diver to a suitable location. The divemaster must be trained in the use of a bell and be qualified to use it.

Diving in a bell is the practice of a decompression chamber. It is considered to be one of the more hazardous diving operations because the pressure is moving and the possibility exists that the diver may become incapacitated before the decompression chamber is available (Tr. 741-2). In the present proposal, liveboarding is limited by the surface-supplied air diving limits, although mixed-gas diving may be used to 200 fsw. This represents a determination that liveboarding is too hazardous for greater times or depths and corresponds with the minimum time and depth limits at which use of a diving bell is required (Tr. 781, 1452; Ex. 154, p. 82). Since liveboarding cannot practically or safely be conducted with a bell (Tr. 751, Ex. 178, p. 184), it is not permitted beyond these depths. There are alternative methods of accomplishing the same work tasks performed in liveboarding (EB). The limit for decompression time has been increased to two days (Tr. 516, 1144-5; Ex. 154, p. 32), the determination of rough seas is therefore unnecessary. The requirement that liveboarding not be conducted in rough seas has been modified to specify which significantly impede diver mobility or work function in response to suggestion that liveboarding be stopped before the dive. A new standard requires that the divers be trained and that the equipment be adequately monitored. The procedures required for liveboarding apply in addition to those for surface-supplied air or mixed-gas diving, and are necessitated by the peculiar characteristics and relative hazards of this technique. The standard requires, in addition to the requirements for the support of the vessel supporting liveboarding, that liveboarding be stopped before the diver is exposed to the water (Tr. 741). This is a necessary precaution against diver entanglement. Second, air must be used in liveboarding operations to protect the diver's home from accidental entanglement with the self-contained propeller. Suggestions for the necessary devices range from a propeller shroud to a propeller guard, to a variety of other devices used to interfere significantly with the vessel maneuverability and thus to increase the hazards of entanglement. Divers are required to use a heavy-duty propeller shroud, and other testimony indicates that using a weight off the bow of the vessel to minimize the hazards of entanglement is a preferred method. The standard does not specify which device must be used, as long as a device or apparatus is used to minimize the hazard of entanglement. The third, the requirement for two-way communication has been extended to include such equipment between the designated divers and the personnel controlling the vessel from which the operations are to be performed (Tr. 1122, 1431). This provision allows the person-in-charge instant communication with the vessel operators and the possibility of an emergency such as hose entanglement to occur. Prior arrangements are available and a divers' carried reserve breathing gas supply must be carried at all liveboarding operations in recognition of the relatively greater hazards of this diving technique. In addition, the personnel controlling the liveboarding operation must be able to communicate with the diver and the diver location or between the person-in-charge and the personnel controlling the vessel. The general personnel requirements that each dive team member must be assigned tasks in accordance with the overall work function and training, and that the designated person-in-charge have experience and training in the conduct of the assigned diving operation, are of particular importance in liveboarding (Tr. 741, 778-9, 1154). This completes the proposal's basic safety procedure.

12. Equipment (1910.430). The equipment section provides basic requirements for equipment of various types in general. The general requirement that work done on or to equipment used in diving operations be recorded in similar to the "equipment log" section of the proposal. Such a log is a basic safety procedure, the equipment log, to be kept by the employer and the tooling and maintenance service could constitute a serious hazard to the health or safety of the diver (Tr. 142-3). The standard permits either tags or logging of the equipment by the inspector. The employer finds more useful or appropriate, in accordance with testimony (Tr. 2072, Ex. 178, p. 112). Requiring the recording of the date and nature of the work performed and the name or initials of the person performing the work should provide the basic information necessary to ascertain the conditions of the equipment in question and whether or not it is in a condition to perform the proposed operation. The record, i.e., log or tag, must be kept until replaced by a substitute log or tag and the equipment to which the record refers is withdrawn from service in the manner prescribed. That a drain valve has been included in the list of required items, in accordance with requirements for liveboarding (Tr. 977, Ex. 123, p. 274). The check valve prevents loss of air from the volume tank if the compressor fails; the pressure gauge tells how much pressure is available, and the relief valve prevents pressure buildup in the vessel. The drain valve can be used to drain water from the volume tank. The requirement that air compressor intake is located in an area away from exhaust and other contaminants is a basic requirement that the purity of the diver's breathing air is maintained.

The air purity standards of the proposal reflect a concern with the quality of breathing air in diving operations, which was testified to by several divers (Tr. 781, 898, 1044-5, 1097). Beyond the permissible contaminant levels contained in the proposal, have been revised, however, in accordance with testimony and the new U.S. Navy air purity standards for divers, which indicate that 20 ppm for carbon dioxide and 100 ppm for carbon monoxide are acceptable exposure levels for divers (Tr. 63, 217-20, 266-7, 1647, 1650-5; Ex. 176, p. 105-6, Ex. 111). The proposal's hydrocarbon limit of 5 milligrams per cubic meter has been defined as oil
mists, as recommended in testimony (Tr. 569-71; Ex. 178, p. 164-7). Where the air sample should be taken is an important factor in determining air purity (Tr. 185): and, in the case of a connection to the distribution system allows air to be monitored near where it enters the system, i.e., driver's hose or chamber. This provides a truer indication of the actual conditions of the system. In the case of testing, by the exclusion of oil mist testing of air delivered by compressors which do not use oil for lubrication is in accordance with testimony that such testing is unnecessary, and the use of such non-oil lubricated compressors should be encouraged (Tr. 167; Ex. 129, p. 181-2; Ex. 178, p. 467). The proposed requirements that air purity be tested every 1000 hours has been deleted to respond to testimony that compressors which run frequently have fewer problems than those run intermittently. The intent is to have a motor of normal/hose type used for testing. The requirement for air sampling was in the proposal and is a basic engineering principle, while the pressure testing requirement has been reordered to better reflect the intent (Tr. 211, 2013-14, 2075-7; Ex. 178, p. 164). A test of 1.5 times the working pressure, rather than the maximum allowable working pressure, is appropriate to determine hose strength but places less stress on the hose, since the pressure prescribed will be well within the designed pressure capability of the hose. With regard to breathing gas supply hose connectors, the standard makes it clear that, despite the bung, the hose itself, must have a working pressure at least equal to the working pressure of the hose, similar to those in the proposal. That they be "resistant to accidental disengagement" has been included in accordance with testimony. It provides that such working pressure must be adequate to ensure the safety of the hose. The standard also includes a requirement for markings, kink-resistance, and calculation of "working pressure". The standard also applies specifically to breathing gas supply hoses (semimobile) between the supply source (i.e., location of a bell) and the diver, because they are not necessary for breathing the surface. The requirement for markings at 10 ft. intervals has been extended to 100 ft. because some decompression tables require depth to exceed 50 ft. While the hose markings should be used as the primary means of depth measurement, they have sometimes been used as a secondary check when the manometer or water manometer is disconnected (Tr. 821-2, 824, 1185). All such requirements for calculating the working pressure relative to the supply source is as stated because such data is not available in sufficient detail on whether the supply source is on the line or on a submerged bell under pressure. The determining factor is the working pressure differential between the supply source and the breathing chamber (Tr. 185). The buoyancy control requirement is similar to the proposal's "dry suit reusable vessels" requirement, but is modified in accordance with testimony (Tr. 1925-5; Ex. 178, p. 103). The purpose of requiring exhaust valves in connection with buoyancy control is to minimize the incidence of monoatomic or low-oxygen content by the diver. The requirement for a buoyancy compensator, if used in SCUBA diving, to have an oxygen source separate from the breathing gas supply is related to the cylinders. The requirement for a reserve and air supply accumulated to prevent diversion of the primary or reserve system into non-emergency use. The provision for an inflatable flotation device for SCUBA diving has been given design specifications because an improperly designed device can be a greater safety hazard than it is a device (Tr. 6, 1-4). Requiring the manually activated device allows for quick inflation while the real inflation device provides for a back-up capability. The function of the exhaust valve is an inflatable flotation device as any buoyancy-changing equipment. The requirements for compressors gas cylinders are similar to those in the proposal. The requirement for design and maintenance criteria for such equipment are already included in existing OSHA standards (1910.166-167), and the applicable provisions of that standard apply to diving operations as well. The protection cap requirement has been modified to make clear that a cap is not required when the cylinder is manually operated or when used for SCUBA diving (Tr. 1909; Ex. 178, p. 111). The requirements for cylinders containing inert gases have been added to prevent accidental rupture of the cylinder. Design and maintenance criteria have been included for decompression chambers. The proposed standard requires all chambers to be built in accordance with the ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code, Section VIII, or an equivalent. There was testimony that other pressure vessel codes, such as Det Norske Veritas, Lloyd's, and the American Bureau of Shipping, all meet acceptable standards which are recognized within the industry (Tr. 1944, 1910). Those codes have been considered equivalent codes under this standard. However, decompression chambers manufactured prior to the effective date of the standard will be in compliance if they are maintained in accordance with the code requirements, to which they were built or their equivalent. The requirement for means of maintaining the oxygen concentration in the chamber atmosphere below a level of 25% by volume directs from the "instant oxygen breathing system" section of the proposal, which has been modified based on testimony (Tr. 1846-8, 1442, 1925-3). Some means to control the chamber's oxygen content is expected when there is being administered by mask for treatment or in surface decompression, as a protection against fire, particularly since the mask can leak (Tr. 1791). The means required to be a fire hazard or explosion, or an overboard dump system. While no written records or oxygen analysis are required, OSHA would limit the time that the oxygen concentration would be periodically analyzed during oxygen administration (Ex. 178, p. 116-11). The muffler requirement has been included in the proposal, which requires mufflers to be used in the chamber to prevent noise suppression of the chamber and also prevent the noise of decompression from excessive disruption of the surrounding environment. The requirements for guards on exhaust outlets and the noise hazards due to the exhaust are essentially the same as the proposal, and have not been modified. The exhaust muffler must be maintained in such a way as to prevent the escape of exhaust gas into surrounding areas. The muffler must be a fire hazard or explosion, or an overboard dump system.
RULRES AND REGULATIONS
requirement is the helmet/mask equiva-
ment to the proposal's dry suit exhaust
valve; the valve is used to control buoy-
ancy and reduce the risk of uncontrolled
ascent to the surface. This is standard
equipment (ETS Exs. 6, 7-10, Ex. 6A(i),
13a, 71), which is either mask or helmet ve-
ration requirement for surface-supplied air
diving is identical to the one appearing in
the proposal, except that the standard
adds a performance specification which
would allow helmets or masks with lower
ventilation rates to be used or developed,
provided they meet the performance re-
quirements. This modification is in ac-
cord with the testimony at the hearings
(Tr. 176-1, 185-6, 204-6, and NIOSH
(Exs. 129, p. 33-31).
The requirements for oxygen safety
procedures have systemwide application.
The oxygen safety requirements ad-
dress primarily the hazard of com-
bustion, and derive from the "oxygen
cleaning" and the "oxygen piping in
PVOC" requirements of the proposal.
That equipment used with oxygen or
mixtures containing over 40% by volume
oxygen must be defined for oxygen
service was testified to at the hearings
(Tr. 192). Examples of metal which
are suited to oxygen service are copper,
brass, and monel. Non-metallic materials
must have low flammability (Exs. 129,
p. 123). Structural factors such as avoid-
ing sharp turns and edges and using slow-
opening valves should also be con-
sidered in determining suitability for
oxygen service. The requirement for
oxygen cleaning for oxygen service gen-
eralizes the proposal's requirements by
applying it to all components (except
umbilicals) used in oxygen service, in
accordance with testimony. Umbilicals
are excluded from the re-
quirement because there is no agreement
as to how they would be cleaned and this is
not current industry practice (Tr.
164). The standard does not specify
which cleaning agents should or should
not be used, because of lack of a gener-
alyzed recognized preferred method
because many effective agents can be
used. It should be noted, however, that
bleach, an oxidizing surfactant, peracetic
acid, a non-fluorinated chlorinated hy-
drocarbon, should not be used because
due to potentially toxic effects of the solvent
and its breakdown products; tri-sodium
phosphate, trichlorofluoromethane and
non-ionic detergents are considered ac-
ceptable agents, while use of ultrasonic
cleaning baths is not recommended and
effective cleaning (Exs. 129, p. 83).
The requirement for slow-opening valves
that the research does not address the hazards of combustion.
It is intended to prohibit the use of
cold water to open the vents or quick-opening valve
because quick-opening valves allow a rapid buildup of emergency situation
heat, in the piping system. If any hydro-
carbons are present in such a situation,
contact with the fuel may be lethal.
It is not recommended to apply to ballstop valves, which are
open under normal operating conditions.
Compressed air systems over 500 psi
are included in this requirement because a
similar combustion hazard exists in high-
pressure air systems.
The weights and harnesses require-
ments derive from similar provisions in
the proposal. The weight belt or assem-
bly requirement is intended to permit
weight assemblies, such as weights car-
pied in pockets, to be used; this is pref-
ergable to specifying only belts. In ac-
cordance with the proposal and testi-
mony, the standard requires the weights
and harness assembly to be quick releasable but does not specify
that the quick release must be "simple" (Tr.
141, 152, 432, 1949; Exs. 178, p. 80).
The harness requirement exempts
SCUBA diving in addition to heavy-year
diving, since harnesses are not used or
needed in these situations. The harness
requirement has been modified in ac-
cordance with testimony that the har-
ness does not have to be "separate" (Ex.
173, p. 82). No testimony was presented
against the positive buckling device re-
quirement, which remains intact.
14. Recording requirement
(1910.460).
The recordkeeping require-
ment of the standard are consistent
with general OSHA policy concerning the
recording, reporting, and availability of record. Part 1904 of 29 CFR is the basic
OSHA regulation on the recording and
reporting of occupational injuries and ill-
nesses. Reference to 29 CFR Part 1904
is included in the final standard, as in
the proposal, to remove any uncertainty.
In addition, em-
ployers are required to record the occur-
rence of any diving-related injury or ill-
ness which requires hospitalization of 24
hours or more. Because of the relatively
small size of the diving population and of
individual diving operations, reports of fatalities or five or more hospitalizations
as required by 29 CFR Part 1904, may
leave unrecorded a substantial propor-
tion of diving accidents. Requiring a re-
cord of hospitalizations of 24 hours or
more will preserve information which can
provide a more complete determination of the incidence of disease and injuries
in the diving industry. In the 24-hour hos-
pitalization period has been used for the
same reasons that have been discussed in
relation to the reexamination after in-
jury or illness requirement; again, this
represents a modification of the 72-
hospitalization or 5 days treatment by a
doctor criteria which appeared in the
proposals.
In addition to recording and reporting
of occupational injuries and illnesses
the other document requirements which the standard requires. These are:
(1) Notification of deaths from the
standard. In an emergency situation a
written submission of the same upon
request of the Area Director (1910.461
(6)).
(2) Physician's written report to
the employer (1910.461(b));
(b) Safe practices manual (1910.420
(4))
List of emergency aid (1910.421
(4))
List of record of dive (1910.423
(5));
Record of each dive (1910.423
(6));
(6) Written evaluation of the decom-
npression procedures assessment (1910.423
(7)).
(6) Tuathing or logging of equipment
procedures (1910.430(a)). The raten-
ne and record support for each of these
diving requirements has already been discussed in the order in
which they appear in the standard.
The requirement to make records available to OSHA officials and to retain records result is not. Effective, for
year varying depending on the type of record, remains from the proposal.
Records which contain essential medical in-
formation, including dive team medical records, records of dives when there has been an incident of decompression sick-
ness, decompression procedures assessment
and documentation, and records of hospital-
talizations, are required to be kept for 5
years. This is consistent with the recom-
pendation of OSHA which is considered an appropriate time period in
which employers must maintain the data
and is consistent with Safety and health
problem of diving can later be studied. After
a record has been retained for five years,
the employer, the records must be for-
warded to the National Institute for
Occupational Safety and Health, which, un-
der Section 20 and 22 of the Act, is
authorized to conduct research, expert-
theses, and demonstrations relating to
occupational safety and health.
Depth time requirements have to be
kept until completion of the recording of
dive or, if appropriate, a decompression
assessment. A separate record of the pro-
file information is not needed at that point. In addition, there has been no incident of decompress-
sion sickness must be retained for a year
by OSHA, and they may also be used for research or study by NIOSH or OSHA. The safe practice
manual and equipment records must be
current because they serve only an op-
tional evaluation, and records which are histori-
cal record is necessary.
In addition, the standard provides for
the availability of any record which per-
tains directly to the employee for inspec-
tion and copying by employees, former
employees or their authorized representa-
tives. This reflects a statutory pro-
vision in section (3) of the Act that em-
ployees have a right to know their work
exposure and medical status. A provision
which requires successor em-
ployers to keep dive and employee medi-
cal records and the forwarding of records
and the forwarding of records to
OSHA which is required to be kept for 5
years to NIOSH in the event that an em-
ployee wishes to do business and there is
no successor, has been included so that
such records will be preserved for at least
5 years.
In developing these requirements,
OSHA has endeavored to require record-
keeping to the extent which is minimally
necessary from the standpoint of safety

FEDERAL REGISTER, VOL. 42, NO. 141—FRIDAY, JULY 22, 1977
and health. On the whole, the requirements should be less burdensome for the small water user, because the safe practices manual will be less complex, less time-consuming, and less expensive for each dive, and the need to assess an incident of decompression sickness should not arise in these situations.

Moreover, the recordkeeping requirements have been simplified in other respects from the proposal. First, as has been discussed, there is no requirement for automatic recording of time-depth profiles, and no need to maintain complicated statistical data in order to satisfy specific performance criteria for decompression sickness. Secondly, the requirements for a diving record log have been deleted. OSHA believes that since the log would, by its nature, have to be maintained by the employer, it would be both difficult and unrealistic to enforce against the employer. Testimony at the hearings maintained that employers would not be willing to rely on the diver's log to verify an employee's compliance with the recordkeeping requirements or to verify that compliance. However, the log has not been deleted, but the agency has determined that the essential information required by this section of the proposal can be obtained and maintained in the form of accurate dive and medical records, such as those required by the standard.

VI. LEGAL AUTHORITY
This standard is promulgated pursuant to sections 3(b), (c), and (e) of the Occupational Safety and Health Act of 1970 (the Act) (84 Stat. 55); 1979 (29 U.S.C. 650 et seq.); and 801 of the Occupational Safety and Health Administration (OSHA), Code of Federal Regulations (CFR), Part 1910, Subpart Q. The requirement of 39 CFR is amended by adding a new permanent occupational safety and health standard for commercial diving operations as Subpart T of Part 1910, entitled "Commercial Diving Operations Объекты." In addition, pursuant to the above authority and section 41 of the Longshoremen's and Harbor Workers' Compensation Act, as amended (44 Stat. 1444; 33 U.S.C. 941) and section 107 of the Contract Work Hours and Safety Standards Act (44 Stat. 1325; 33 U.S.C. 931), the contractor and the Secretary of Labor are authorized to carry out the provisions of this section in work performed under contracts with the United States. The Secretary of Labor is authorized to issue such rules and regulations as may be necessary to carry out the provisions of this section.

This document was prepared under the direction of Rula Bowman, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue NW, Room 8-3218, Washington, D.C. (202- 195-0200). It is signed at Washington, D.C., this 14th day of July, 1977.

RULA BOWMAN
Assistant Secretary of Labor.

PART 1910—COMMERCIAL DIVERS

Signed at Washington, D.C., this 15th day of July, 1977.

Flora Bowman
Assistant Secretary of Labor.

PART 1910—COMMERCIAL SAFETY

and HEALTH STANDARDS

Part 1910 of Title 29 of the Code of Federal Regulations is amended by adding a new subpart T to read as follows:

Subpart T—Commercial Diving Operations

§1910.401 Scope and application.

(a) Scope. (1) This subpart applies to every place of employment within the waters of the United States, or within any State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, Guam, the Trust Territory of the Pacific Islands, Wake Island, Johnston Island, the Canal Zone, or the islands within the Outer Continental Shelf lands as defined in the Outer Continental Shelf Lands Act (47 Stat. 642, 43 U.S.C. 1331) which are devoted to commercial diving operations in which related and support operations are performed.

(2) This standard applies to diving and related support operations conducted in connection with all types of work and employment, including general industry, construction, ship repairing, shipbuilding, shipbreaking and longshore. However, this standard does not apply to any diving operation:

(1) Performed solely for instructional purposes, using open-circuit, compressed-air SCUBA and conducted within the no-decompression limits.

(2) Performed solely for search, rescue, or related public safety purposes by or under the control of a governmental agency.

(3) Governed by 45 CFR Part 46 (Protection of Human Subjects, U.S. Department of Health, Education, and Welfare) or equivalent rules or regulations established by another Federal agency, which regulate research, development, or related purposes involving human subjects.

(b) Application to emergencies. An employer may apply the provisions of this standard to the extent necessary to prevent or minimize a situation which is likely to cause death, serious physical harm, or major environmental damage, provided that the employer:

(1) Notifies the Area Director, Occupational Safety and Health Administration within 48 hours of the onset of the emergency situation indicating the nature of the emergency and extent of the deviation from the prescribed regulations;

(2) Upon request from the Area Director, submits such information in writing;

(3) Employer obligation. The employer shall be responsible for compliance with:

(i) All provisions of this standard of general applicability; and

(ii) All requirements pertaining to specific diving modes to the extent diving operations in such modes are conducted.

§ 1910.402 Definitions.

As used in this standard, the listed terms are defined in the following:

"Acme": Actual cubic feet per minute.

"ASME": American Society of Mechanical Engineers.

"ASME Boiler and Pressure Vessel Code": Section VIII, of the ASME Boiler and Pressure Vessel Code, which the employer can demonstrate to be equally effective.

"Atmosphere absolute": Atmosphere absolute.

"Bell": An enclosed compartment, pressurized (closed bell) or unpressurized (open bell), which allows the diver to be transported to and from the underwater work area and which may be used as a temporary refuge during diving operations.

"Bottom time": The total elapsed time measured in minutes from the time when the diver leaves the surface in descent to the time that the diver begins ascent.

"Burping pressure": The pressure at which the pressure containment device would fail structurally.

"Cylinder": A pressure vessel for the storage of compressed air

"Decompression chamber": A pressure vessel for human occupancy such as a surface decompression chamber, closed bell, or deep diving system used to decompress divers and to treat decompression sickness.

"Decompression sickness": A condition with a variety of symptoms which
RULES AND REGULATIONS

may result from gas or bubbles in the tissues of divers after pressure reduction. A profile or set of profiles of depth-time relationships for ascent rates and breathing mixtures to be followed after a specific depth-time exposure or exposures.

"Dive location": A surface or vessel from which a diving operation is conducted.

"No-decompression limit": The depth-time limits of the "no-decompression limit and repetitive dive group designations for no-decompression air dives". U.S. Navy Diving Manual or equivalent limits which the employer can demonstrate to be equally effective.

"Surface-supplied air diving": A diving mode in which the diver is supplied with compressed air for breathing.

"Treatment table": A depth-time and breathing gas profile designed to treat decompression sickness.

"Unbilical": The composite hose bundle including the air hose or bell, or between a diver and a bell, which supplies the diver or bell with breathing gas, communication power, or heat as appropriate to the diving mode or conditions, and includes a safety line between the diver and the dive location.

"Volume tank": A pressure vessel containing the outlet of a compressor and used as an air reservoir.

"Working pressure": The maximum pressure to which a pressure containment device may be exposed under standard operating conditions.

PERSONNEL REQUIREMENTS

§ 1910.410 Qualifications of dive team.

(a) General. (1) Each dive team member shall have the experience or training necessary to perform assigned tasks in a safe and healthful manner.

(b) Each dive team member shall have experience or training in the following:

(1) The use of tools, equipment and systems relevant to assigned tasks.

(2) Techniques of the assigned diving mode.

(3) Diving operations and emergency procedures.

(c) All dive team members shall be trained in cardiopulmonary resuscitation and first aid (American Red Cross, standard course or equivalent).

(d) Diving team members who are experienced to or control the exposure of others to hyperbaric conditions shall be trained in diving-related physics and physiology.

(e) Assignments. (1) Each dive team member shall be assigned tasks in accordance with the employee's experience or training, except that limited additional tasks may be assigned to an employee undergoing training provided that these tasks are performed under the direct supervision of an experienced dive team member.

(2) The employer shall not require a dive team member to be exposed to hyperbaric conditions against the employee's will, except when necessary to complete decompression or treatment procedures.

(3) The employer shall not permit a dive team member to dive or be otherwise exposed to hyperbaric conditions for the duration of any temporary physical impairment or condition which is known to the employer and is likely to affect adversely the safety or health of a dive team member.

(f) The designated person-in-charge shall have experience and training in the conduct of the assigned diving operation.

§ 1910.411 Medical requirements.

(a) General. (1) The employer shall determine that dive team members are or are likely to be, exposed to hyperbaric conditions are medically fit to perform assigned tasks in a safe and healthful manner.

(2) The employer shall provide each dive team member who is, or is likely to be, exposed to hyperbaric conditions with all medical examinations required by this standard.

(3) All medical examinations required by this standard shall be performed by, or under the direction of, a physician at no cost to the employee.

(b) Frequency of medical examinations. Medical examinations shall be provided:

(1) Prior to initial hyperbaric exposure with the employer, unless an equivalent medical examination has been given within the preceding 12 months and the employer has obtained the results of the examination, and an opinion from the examining physician of the employee's medical fitness to dive or to be otherwise exposed to more than 24 hours shall be appropriate to the nature and extent of the injury or illness as determined by the examining physician.

(2) After an injury or illness requiring hospitalization of more than twenty-four hours.

(c) Information provided to examining physician. The employer shall provide the following information to the examining physician:

(1) A copy of the medical requirements of this standard;

(2) A copy of the required pre-employment and post-employment physical examination, and a description of the physical fitness and extent of hyperbaric conditions to which the dive team member will be exposed, including diving modes and types of work to be assigned.

(d) Conduct of medical examinations. (1) Medical examinations conducted initially and annually shall consist of the following:

(1) Medical history;

(2) Physical examination;

(3) Basic physical examination.

(4) The tests required by Table 1:

(5) Any additional tests the physician considers necessary.

(e) Exclusion of medical examinations conducted after an injury or illness requiring hospitalization of more than twenty-four hours shall be appropriate to the nature and extent of the injury or illness as determined by the examining physician.

Table 1-Tests for diving medical examination.

<table>
<thead>
<tr>
<th>Test</th>
<th>Initial examination</th>
<th>Annual examination</th>
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<tbody>
<tr>
<td>Chest X-ray</td>
<td>X</td>
<td>X</td>
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<tr>
<td>ECG</td>
<td>X</td>
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<td>Copy speed</td>
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<td>Risk factor profile</td>
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<tr>
<td>Medical history</td>
<td>X</td>
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To be given to the employee once, at age 18 or over.

(f) Physician's written report. After any medical examination required by this standard, the employer shall obtain a written report prepared by the examining physician containing:

FEDERAL REGISTER, VOL. 49, NO. 141—MONDAY, JUNE 22, 1977
RULES AND REGULATIONS

to each diving operation, unless otherwise specified.
(a) Emergency aid. A list shall be kept at each location of the telephone or call numbers of the following:
(1) An operational decompression chamber (if not at the dive location);
(2) Accessible hospitals;
(3) Services of physicians;
(4) Available means of transportation;
and
The nearest U.S. Coast Guard Rescue Coordination Center.
(b) First aid kit appropriate for the diving operation and approved by a physician shall be available at the dive location.
(c) Used in a decompression chamber, the first aid kit shall be suitable for use under hyperbaric conditions.
(d) In addition to any other first aid supplies, an American Red Cross standard first aid handbook and a first aid manual resuscitator with a transparent mask and tubing shall be available at the dive location.
(e) Planning and assessment. Planning of a diving operation shall include an assessment of the safety and health aspects of the following:
(1) Diving gang;
(2) Surface and underwater conditions and hazards;
(3) Air breathing gas supply (including reserves);
(4) Thermal protection;
(5) Diving equipment and systems;
(6) Diving and assignments and physical fitness of the members (including any impairment known to the employer);
(f) Repetitive dive designation or residual inert gas status of dive team members.
(g) Decompression and treatment procedures (including altitude corrections);
(h) Emergency procedures.
(i) Minor accidents. To minimize hazards to the dive team, diving operations shall be coordinated with other activities in the vicinity which are likely to interfere with the diving operation.
(j) Emergency briefing. (i) Diving team members shall be briefed on:
(1) The tasks to be undertaken;
(2) Safety procedures for the diving mode;
(3) Any unusual hazards or environmental conditions likely to affect the safety of the diving operation; and
(4) Any modifications to operating procedures necessitated by the specific diving operation.
(2) Prior to making individual dive team member assignments, the employer shall inquire into the dive team member's physical fitness, and indicate to the dive team member the proper state of physical fitness and adverse physiological effects during and after the dive.
(3) Equipment inspection. The breathing gas supply system including reserve breathing gas supplies, masks, helmets, thermal protection, and bell handling mechanism (where appropriate) shall be inspected prior to each dive.

(b) Warning signal. When diving from surfaces other than vessels in area capable of supporting traffic, a rigid reply of the international code flag "A" at least one meter in height shall be displayed at the dive location in a manner which allows all-round visibility, and shall be illuminated during night diving operations.

§ 1910.422 Procedures during dive.
(a) General. The employer shall comply with the following requirements which are applicable to each diving operation unless otherwise specified.
(b) Means capable of supporting the diving shall be provided for entering and exiting the diving location.
(c) The means provided for exiting the water shall extend below the water surface.
(d) The means shall be provided to assist an injured diver from the water or into a bell.
(e) Communications. (1) An operational two-way voice communication system shall be used between:
(1) Each supplied air or mixed-gas diver and a dive team member at the dive location or bell (when provided or required); and
(2) The bell and the dive location.
(2) Diving profiles. A depth-time profile, including when appropriate any breathing gas changes, shall be made for the dive including decompression.
(3) Welding and burning tools and equipment. (1) Hand-held electric tools and equipment shall be de-energized before the water is placed into the water or retrieved from the water.
(2) Hand-held power tools shall not be supplied with power from the dive location until requested by the diver.
(3) Welding and burning. (1) A current supply switch to interrupt the current flow to the welding or burning electrode shall be:
(2) Tended by a dive team member in voice communication with the welding or burning; and
(4) In the open position except when welding or burning.
(5) Welding machine frame shall be grounded.
(6) Welding and burning cables, electric holders, and connections shall be capable of carrying the maximum current required by the work and shall be properly insulated.
(7) Insulated gloves shall be provided to divers performing welding and burning operations.
(2) Prior to welding or burning on or in closed compartments, structures or pipes, which contain a flammable vapor or in which a flammable vapor may be generated by the work, they shall be

General Operations Procedures

(a) General. The employer shall develop and maintain a safe practices manual which shall be made available at the dive location to each diving team member.
(b) Contents. (1) The safe practices manual shall contain a copy of this standard and the employer's policies for implementing the requirements of this standard.
(c) For each diving mode engaged in, the safe practices manual shall include:
(1) Safety procedures and checklists for diving operations;
(2) Assignments and responsibilities of the dive team members;
(3) Equipment procedures and checklists; and
(4) Emergency procedures for fire, equipment failure, adverse environmental conditions, and medical illness and injury.

§ 1910.421 Pre-dive procedures.
(a) General. The employer shall comply with the following requirements prior to each diving operation, unless otherwise specified:
(b) Emergency aid. A list shall be kept at each location of the telephone or call numbers of the following:
(1) An operational decompression chamber (if not at the dive location);
(2) Accessible hospitals;
(3) Services of physicians;
(4) Available means of transportation;
and
The nearest U.S. Coast Guard Rescue Coordination Center.
(c) First aid supplies. (1) First aid kit appropriate for the diving operation and approved by a physician shall be available at the dive location.
(2) When used in a decompression chamber, the first aid kit shall be suitable for use under hyperbaric conditions.
(d) Planning and assessment. Planning of a diving operation shall include an assessment of the safety and health aspects of the following:
(1) Diving gang;
(2) Surface and underwater conditions and hazards;
(3) Air breathing gas supply (including reserves);
(4) Thermal protection;
(5) Diving equipment and systems;
(6) Diving assignments and physical fitness of the members (including any impairment known to the employer);
(e) Repetitive dive designation or residual inert gas status of dive team members.
(f) Decompression and treatment procedures (including altitude corrections);
(g) Emergency procedures.
(h) Minor accidents. To minimize hazards to the dive team, diving operations shall be coordinated with other activities in the vicinity which are likely to interfere with the diving operation.
(i) Emergency briefing. (i) Diving team members shall be briefed on:
(1) The tasks to be undertaken;
(2) Safety procedures for the diving mode;
(3) Any unusual hazards or environmental conditions likely to affect the safety of the diving operation; and
(4) Any modifications to operating procedures necessitated by the specific diving operation.
(2) Prior to making individual dive team member assignments, the employer shall inquire into the dive team member's physical fitness, and indicate to the dive team member the proper state of physical fitness and adverse physiological effects during and after the dive.
(3) Equipment inspection. The breathing gas supply system including reserve breathing gas supplies, masks, helmets, thermal protection, and bell handling mechanism (where appropriate) shall be inspected prior to each dive.

(b) Warning signal. When diving from surfaces other than vessels in areas capable of supporting traffic, a rigid reply of the international code flag "A" at least one meter in height shall be displayed at the dive location in a manner which allows all-round visibility, and shall be illuminated during night diving operations.

§ 1910.422 Procedures during dive.
(a) General. The employer shall comply with the following requirements which are applicable to each diving operation unless otherwise specified.
(b) Means capable of supporting the diving shall be provided for entering and exiting the dive location.
(c) The means provided for exiting the water shall extend below the water surface.
(d) The means shall be provided to assist an injured diver from the water or into a bell.
(e) Communications. (1) An operational two-way voice communication system shall be used between:
(1) Each supplied air or mixed-gas diver and a dive team member at the dive location or bell (when provided or required); and
(2) The bell and the dive location.
(2) Diving profiles. A depth-time profile, including when appropriate any breathing gas changes, shall be made for the dive including decompression.
(3) Welding and burning tools and equipment. (1) Hand-held electric tools and equipment shall be de-energized before the water is placed into the water or retrieved from the water.
(2) Hand-held power tools shall not be supplied with power from the dive location until requested by the diver.
(3) Welding and burning. (1) A current supply switch to interrupt the current flow to the welding or burning electrode shall be:
(2) Tended by a dive team member in voice communication with the welding or burning; and
(4) In the open position except when welding or burning.
(5) Welding machine frame shall be grounded.
(6) Welding and burning cables, electric holders, and connections shall be capable of carrying the maximum current required by the work and shall be properly insulated.
(7) Insulated gloves shall be provided to divers performing welding and burning operations.
(2) Prior to welding or burning on or in closed compartments, structures or pipes, which contain a flammable vapor or in which a flammable vapor may be generated by the work, they shall be
rented, flooded, or purged with a mixture of gases which will not support combustion.

(b) Explosives. (1) Employers shall transport, store, and use explosives in accordance with the applicable provisions of §1910.105 and §1928.912 of Title 29 of the Code of Federal Regulations.

(2) Electrical continuity of explosive circuits shall not be tested until the diver is out of the water.

(3) Explosives shall not be detonated while the diver is in the water.

(i) Termination of dive. The working interval of a dive shall be terminated when:

(1) A diver requests termination;

(2) A dive fails to respond correctly to commands or signals from a dive team member;

(3) Diving operations are lost and cannot be quickly re-established between the diver and a dive team member at the dive location; and

(4) A diver begins to use a diver-carried reserve breathing gas or the dive location.

§1910.423 Post-dive procedures.

(a) General. The employer shall comply with the following requirements which are applicable after each diving operation, unless otherwise specified:

(1) Procedures. (i) After the completion of any dive, the employer shall:

(A) Check the physical condition of the diver;

(B) Instruct the diver to report any physical problems or adverse physiological effects including symptoms of decompression sickness;

(C) Advise the diver of the location of a decompression chamber which is ready for use; and

(D) Alert the diver to the potential hazards of flying after diving.

(ii) For a dive outside the no-decompression limits, deeper than 100 ft wvd or using mixed gas as a breathing mixture, the employer shall instruct the diver to remain awake and in the vicinity of the dive decompression chamber at the dive location for at least one hour after the dive (including decompression or treatment as appropriate).

(2) Decompression capability. (i) A decompression chamber capable of recompressing the diver at the surface to a minimum of 100 ft wvd (4 ATAs) shall be available at the dive location for:

(A) Surface-supplied air diving to depths of more than 100 ft and shallower than 320 ft wvd;

(B) Mixed gas diving shallower than 320 ft wvd; and

(C) Diving outside the no-decompression limits shallower than 320 ft wvd.

(ii) A decompression chamber capable of recompressing the diver at the surface to the maximum depth of the dive shall be available at the dive location for dives deeper than 320 ft wvd.

(iii) The decompression chamber shall be:

(1) Dual-lock;

(2) Multiple; and

(3) Located within 5 minutes of the dive location.

(4) The decompression chamber shall be equipped with:

(A) A pressure gauge for each pressurized compartment designed for human oxygen;

(B) A built-in-breathing-system with a minimum of one mask per occupant;

(C) A two-way voice communication system between occupants and a dive team member at the dive location; and

(D) A viewport and illumination capability to light the interior.

(5) Treatment tables, treatment gas, appropriate Procedure diving modes, and sufficient gas to conduct treatment shall be available at the dive location.

(iii) A dive team member shall be available at the dive location during and for at least one hour after the dive to operate the decompression chamber (when required or provided).

(7) Record of dive. (1) The following information shall be recorded and maintained for each diving operation:

(A) Names of dive team members including designated person-in-charge;

(B) Date, time, and location;

(C) Diving modes used;

(D) General nature of work performed;

(E) Approximate underwater and surface conditions (visibility, water temperature and current); and

(F) Maximum depth and bottom time for each diver.

(2) For each dive outside the no-decompression limits, deeper than 100 ft wvd or using mixed gas, the following additional information shall be recorded and maintained:

(A) Depth-time and breathing gas profiles;

(B) Decompression table designation (including modification); and

(C) Expected time since last pressure exposure if less than 24 hours or repetitive dive designation for each diver.

(3) For each dive in which decompression sickness is suspected or symptoms are evident, the following additional information shall be recorded and maintained:

(A) Description of decompression sickness symptoms (including depth and time of onset); and

(B) Description and results of treatment.

(8) Decompression procedure assessment. Each diver shall:

(1) Investigate and evaluate each instance of decompression sickness based on the recorded information, consideration of the past performance of decompression tables used, and individual susceptibility;

(2) Take appropriate corrective action to prevent the probability of recurrence of decompression sickness; and

(3) Prepare a written evaluation of the decompression procedure assessment, including any corrective action taken, within 48 days of the incident of decompression sickness.

§1910.424 SCUBA diving.

(a) General. Employers engaged in SCUBA diving shall comply with the following requirements, unless otherwise specified.

(b) Limits. SCUBA diving shall not be conducted:

(1) At depths deeper than 120 ft wvd;

(2) At depths deeper than 100 ft wvd or outside the no-decompression limits unless a decompression chamber is ready for use;

(3) Against currents exceeding one (1) knot unless line-tended;

(4) In enclosed or physically confining spaces unless line-tended;

(5) Diving outside the no-decompression limits;

(6) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus;

(7) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus;

(8) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus;

(9) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus;

(10) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus;

(11) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus;

(12) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus;

(13) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus;

(14) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus;

(15) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus;

(16) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus;

(17) Using a separate reserve breathing gas exceeding the volume of oxygen supplied by the diving apparatus for 30 minutes or less in the event of failure of the breathing apparatus.

§1910.425 Surface-supplied air diving.

(a) General. Employers engaged in surface-supplied air diving shall comply with the following requirements, unless otherwise specified.

(b) Limits. (1) Surface-supplied air diving shall not be conducted at depths deeper than 120 ft wvd, except that dives with bottom times of 30 minutes or less may be conducted at depths up to 120 ft wvd.

(2) A decompression chamber shall be ready for use at the dive location for any dive outside the no-decompression limits or deeper than 100 ft wvd.

(3) A well shall be used for dives with an inerted decompression time greater than 120 minutes, except when heavy gear is worn or diving is conducted in physically confining spaces.

(c) Procedures. (1) Each diver shall be continuously tended while in the water.

(2) A diver shall be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces.

(3) Each diving operation shall have a primary breathing gas supply sufficient to support divers for the duration of the planned dive including decompression.

(4) No dives shall exceed 100 ft wvd or outside the no-decompression limits:

(A) A separate dive team member shall tend each diver in the water;

(B) A standby diver shall be available while a diver is in the water;

(C) A standby diver shall be available while a diver is in the water;

(D) A standby diver shall be available while a diver is in the water;

(E) A standby diver shall be available while a diver is in the water;

(F) A standby diver shall be available while a diver is in the water;

(G) A standby diver shall be available while a diver is in the water;

(H) A standby diver shall be available while a diver is in the water;

(I) A standby diver shall be available while a diver is in the water;

(J) A standby diver shall be available while a diver is in the water;

(K) A standby diver shall be available while a diver is in the water;

(L) A standby diver shall be available while a diver is in the water;

(M) A standby diver shall be available while a diver is in the water;

(N) A standby diver shall be available while a diver is in the water;

(O) A standby diver shall be available while a diver is in the water;

(P) A standby diver shall be available while a diver is in the water;

(Q) A standby diver shall be available while a diver is in the water;

(R) A standby diver shall be available while a diver is in the water;

(S) A standby diver shall be available while a diver is in the water;

(T) A standby diver shall be available while a diver is in the water;

(U) A standby diver shall be available while a diver is in the water;

(V) A standby diver shall be available while a diver is in the water;

(W) A standby diver shall be available while a diver is in the water;

(X) A standby diver shall be available while a diver is in the water;

(Y) A standby diver shall be available while a diver is in the water;

(Z) A standby diver shall be available while a diver is in the water.

**FEDERAL REGISTER, VOL. 42, NO. 161—FRIDAY, JULY 29, 1977**
(III) A diver-carried reserve breathing gas supply shall be provided for each diver except when heavy gear is worn.

(IV) A dive-location reserve breathing gas supply shall be provided.

(5) For heavy-gear diving deeper than 100 ft or outside the no-decompression limits:

(1) An extra breathing gas hose capable of supplying breathing gas to the diver in the water shall be available to the standby diver.

(2) An inventory stage shall be provided to divers in the water.

(3) Except when heavy gear is worn or where physical space does not permit, a diver-carried reserve breathing gas supply shall be provided for divers in the water.

§ 1910.442 Mixed-gas diving.

(a) General. Employers engaged in mixed-gas diving shall comply with the following requirements, unless otherwise specified.

(b) Limits. Mixed-gas diving shall be conducted only when:

(1) A decompression chamber is ready for use at the dive location; and

(2) A bell is used at depths greater than 200 ft or when the dive involves an average decompression time of greater than 120 minutes, except when heavy gear is worn or when diving in physically confining spaces; or

(3) A closed bell is used at depths greater than 300 ft, except when diving in conducted in physically confining spaces.

(c) Procedures. (1) A separate dive team member shall tend each diver in the water.

(2) A standby diver shall be available while a diver is in the water.

(3) A diver shall be stationed at the underwater position only when diving is conducted in enclosed or physically confining spaces.

(d) Each diving operation shall have a primary breathing gas supply sufficient to support divers for the duration of the planned dive including decompression.

(e) Each diving operation shall have a dive-location reserve breathing gas supply.

(f) When heavy gear is worn:

(1) An extra breathing gas hose capable of supplying breathing gas to the diver in the water shall be available to the standby diver; and

(2) An inventory stage shall be provided to divers in the water.

(3) When a closed bell is used, one dive team member in the bell shall be available and tend the diver in the water.

(4) Except when heavy gear is worn or where physical space does not permit, a diver-carried reserve breathing gas supply shall be provided for each diver:

(1) Diving deeper than 100 ft or outside the no-decompression limits; or

(2) Protected by decompression under the configuration of the dive area from directly ascending to the surface.

§ 1910.443 Liveboating.

(a) General. Employers engaged in diving operations involving liveboating shall comply with the following requirements:

(b) Limits. Diving operations involving liveboating shall not be conducted:

(1) With an inwater decompression time of greater than 120 minutes;

(2) Using surface-supplied air at depths deeper than 180 ft, except that dives with bottom times of 30 minutes or less may be conducted to depths of 220 ft;

(3) Using mixed gas at depths greater than 220 ft; or

(4) In areas in which significant impede diver mobility or work function; or

(5) In other than daylight hours.

(c) Procedures. (1) The propeller of the vessel shall be stopped before the diver enters or exits the water.

(2) A device shall be used which minimizes the possibility of entanglement of the diver's hose in the propeller of the vessel.

(3) Two-way voice communication between the designated person-in-charge and the person controlling the vessel shall be available while the diver is in the water.

(4) A standby diver shall be available while a diver is in the water.

(5) A diver-carried reserve breathing gas supply shall be carried by each diver engaged in liveboating operations.

§ 1910.430 Equipment, Procedures and Requirements.

(a) General. (1) All employers shall comply with the following requirements, unless otherwise specified.

(2) Each equipment modification, repair, test, calibration or maintenance service shall be recorded by means of a tagging or logging system, and include the date and nature of work performed, the name or initials of the person performing the work.

(b) Air compressor systems. (1) Compressors used to supply air to the diver shall be equipped with a volume tank or pressure gauge, a relief valve, and a non-return valve.

(2) Air compressor intake shall be located away from areas containing combustible or other contaminates.

(3) Respirable air supplied to a diver shall not contain more than one part of carbon monoxide (CO) greater than 50 ppm; or

(4) A level of carbon dioxide (CO2) greater than 1,000 ppm; or

(5) A level of oil mist greater than 50 milligrams per cubic meter; or

(6) A noxious or pronounced odor.

(4) The output of air compressor systems shall be tested for air purity every six months by means of samples taken at the connection to the distribution system, except that non-oil lubricated compressors need not be tested for oil mist.
(3) Each decompression chamber shall be equipped with:
(i) Means to maintain the atmosphere below a level of 25% oxygen by volume;
(ii) Muffs on intake and exhaust lines, which shall be regularly inspected and maintained;
(iii) Section guards on exhaust line openings; and
(iv) A means for extinguishing fire, and shall be maintained to minimize the sources of ignition and combustible material.

(1) Gauges and timekeeping devices.

(a) Gauges indicating diver depth which can be read at the dive location shall be used for all dives except SCUBA.

(b) Each depth gauge shall be dead-weight tested or calibrated against a master reference gauge every six months, and when there is a discrepancy greater than two percent (2%) of full scale between any two equivalent gauges.

(c) A cylinder pressure gauge capable of being monitored by the diver during the dive shall be worn by each SCUBA diver.

(4) A timing device shall be available at each dive location.

(5) Masks and helmets. (1) Surface-supplied air and mixed-gas masks and helmets shall have:

(i) A non-return valve at the attachment point between helmet or mask and hose which shall close readily and positively; and

(ii) A mask exhaust valve.

(2) Surface-supplied air masks and helmets shall have a minimum ventilation rate capability of 4.5 acfm at any depth at which they are operated, or the capability of maintaining the diver expired carbon dioxide partial pressure below 0.02 ATA when the diver is producing carbon dioxide at the rate of 1.6 standard liters per minute.

(1) Oxygen safety. (1) Equipment used with oxygen or mixtures containing over forty percent (40%) by volume oxygen shall be designed for oxygen service.

(2) Components (except umbilicals) exposed to oxygen or mixtures containing over forty percent (40%) by volume oxygen shall be cleaned of flammable materials before use.

(2) Oxygen systems over 125 psi and compressed air systems over 500 psi shall have slow-opening shut-off valves.

(3) Weights and harnesses. (1) Except when heavy gear is worn, divers shall be equipped with a weight belt or assembly capable of quick release.

(2) Except when heavy gear is worn or in a decompression diving, each diver shall wear a safety harness with:

(i) A decompression device;

(ii) An attachment point for the umbilical to prevent strain on the mask or helmet; and

(iii) A lifting point to distribute the pull force of the line over the diver's body.

RECORDKEEPING

§ 1910.440 Recordkeeping requirements.

(a) Recording and Reporting. (1) The employer shall record and report occupational injuries and illnesses in accordance with requirements of 29 CFR Part 1904.

(2) The employer shall record the occurrence of any diving-related injury or illness which requires any dive team to be hospitalized for 24 hours or more, specifying the circumstances of the incident and the extent of any injuries or illnesses.

(b) Availability of records. (1) Upon the request of the Assistant Secretary of Labor for Occupational Safety and Health, or the Director, National Institute for Occupational Safety and Health, Department of Health, Education and Welfare, or their designee, the employer shall make available for inspection and copying any record or document required by this standard which pertains to the individual employee or former employee.

(2) Upon request of any employee, former employee or authorized representative, the employer shall make available for inspection and copying any record or document required by this standard which pertains to the individual employee or former employee.

(c) Records and documents required by this standard shall be retained by the employer for the following periods:

(1) Dive team member medical records (physician's reports) (§ 1910.410)—5 years.

(2) Safety practices manual (§ 1910.400) —current document only.

(3) Depth-time profile (§ 1910.420) —until completion of the recording of member to be included in the decompression procedure assessment where there has been an incident of decompression sickness.

(4) Recording of dive (§ 1910.420) —except 5 years where there has been an incident of decompression sickness.

(5) Decompression procedure assessment evaluations (§ 1910.420) —5 years.

(6) Equipment inspections and testing records (§ 1910.430) —current entry or tag, or until equipment is withdrawn from service.

(7) Records of hospitalizations (§ 1910.440) —5 years.

(8) After the expiration of the retention period of any record required to be kept for 5 years, the employer shall forward such records to the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare.

(9) In the event the employer ceases to do business:

(1) The successor employer shall receive and retain all dive and employee medical records required by this standard;

(2) If there is no successor employer, dive and employee medical records shall be forwarded to the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare.

(3) Effective date.

This standard shall be effective on October 23, 1977, except that for provisions where decompression chambers or bells are required and such equipment is not yet available, employers shall comply as soon as possible thereafter but in no case later than 6 months after the effective date of the standard.

APPENDIX A

EXAMPLES OF CONDITIONS WHICH MAY INDIRECTLY OR LIMIT EXPOSURE TO HYPERBARIC CONDITIONS

The following disorders may restrict or limit occupational exposure to hyperbaric conditions depending upon severity, presence of residual effects, response to therapy, number of occurrences, diving mode, or degree and duration of isolation.

History of severe disorder other than recent mild conditions.

Malignancies (active) unless treated and with recurrence for 5 yrs.

Chronic inability to exercise strenuous or middle seat performance.

Cystic or cystic disease of the lungs.

Injured organ function caused by alcohol or drug use.

Conditions requiring continuous medication for control (e.g., antihistamines, steroids, barbiturates, moodaltering drugs, or insulin).

Meniere's disease.

Monsohizophrenia.

Obstructive or restrictive lung disease.

Vascular or organ destruction.

Cardiac abnormality (e.g., pathologic heart block, valvular disease, intraventricular conduction defects other than isolated right bundle branch block, angina pectoris, arrhythmia, coronary artery disease).

Juvenile arthritis.
RULES AND REGULATIONS

PART 1926—SAFETY AND HEALTH
REGULATIONS FOR CONSTRUCTION

6. Paragraph (e) of § 1926.605 is amended to read as follows:

§ 1926.605 Marine operations and equipment.

• • • • • •

(e) Commercial diving operations. Commercial diving operations shall be subject to Subpart T of Part 1910, §§ 1910.401–1910.441, of this Chapter.

PART 1928—SAFETY AND HEALTH
STANDARDS FOR AGRICULTURE

§ 1928.21 (Amended)

7. Section 1928.21(b) of 29 CFR Part 1928 is amended by substituting the letter T for S in the fourth line of the paragraph.

(See 8, 8, 84 Stat. 1556, 1599 (29 U.S.C. 655, 657); Sec. 41, 44 Stat. 1444 (33 U.S.C. 941); Sec. 107, 43 Stat. 96 (40 U.S.C. 333); Secretary of Labor's Order 8-76 (41 FR 25050); 29 CFR Part 1911).

[FED Reg. 77-10043 Filed 7-31-77; 8:45 am]