TEXAS A&M UNIVERSITY CORPUS CHRISTI

Diving Standards for Underwater Operations

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TEXAS A&M UNIVERSITY - CORPUS CHRISTI

EDITOR/AUTHOR

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FOREWORD

Because Texas A&M University–Corpus Christi (hereafter TAMU-CC or university) has established an employer-employee relationship, compliance with OSHA Standard 29 is mandatory. As a result, diving engaged by TAMU-CC staff requires compliance with CFR 1910 Subpart T, *Standards for Commercial Dive Operations*. For further guidance with procedural compliance, TAMU-CC looked to the Association of Diving Contractors International (ADCI) *International Consensus Standards for Commercial Diving and Underwater Operations* and the American Academy of Underwater Sciences (AAUS) *Standards for Scientific Diving*. These two organizations are recognized by OSHA as having representative dive standards exemplary in their areas of expertise. Additional Standards of view were gleaned from the National Oceanic & Atmospheric Administration's (NOAA) Working & Scientific Diving Standards and Safety Manuals.

This manual sets forth the policies, procedures, and standards which govern training and diving operations of all persons participating in the TAMU-CC diving program. It applies to all divers operating under university auspices, including all visiting divers, all individuals who wish to dive at university facilities, all divers using university equipment, and to those university officials responsible for the management and administration of the dive program. Furthermore, this manual was written to ensure all diving under the auspices of TAMU-CC is conducted in a manner that protects all divers from accidental injury and/or illness. TAMU-CC's mechanism for determining which standard a dive operation will follow will be the authority vested to its Diving Control Board and Diving Safety Officer.

It is important for all TAMU-CC divers to realize that the regulations of this manual are intended to provide for their safety and maximize their personal protection.

For the divers that will operate under this umbrella of safety, special thanks are offered to the colleagues, advisors, and TAMU-CC staff who took the time to help edit this document.

Larry Lloyd
Diving Safety Officer
Texas A&M University–Corpus Christi

RECORD OF CHANGES

DATE	SECTION	DESCRIPTION
02/10/1995		Re-write of the original “Dive Safety Manual” as Edited by Kevin B. Strychar, Ph.D. and the TAMU-CC Diving Control Board, by Quenton Dokken, Ph.D., and subsequently renamed “Texas A&M University–Corpus Christi Manual of Scientific Diving Guidelines”.
06/15/2013		Re-write of the 1995 Manual of Scientific Diving Guidelines to bring the TAMU-CC program into compliance with OSHA CFR 2910 Sub-part T, Standards for Commercial Dive Operations.
01/15/2014		Incorporation of AAUS Standards Committee edits.
03/16/2017		Incorporation of procedures and protocols for Hookah as a diving mode, Reserve Gas Supplies, and requirements for manpower and standby divers per DCB recommendations January 2017. Primary sections affected 4, 5, 7, and 12.
10/27/2017		Section 3.3(b) Diver Status Maintenance. The AAUS wording was replaced with a specific interpretation and wording. Approval was made final by the three Voting members with the input from the Advisors.
05/29/2019		Incorporated AAUS 2018 updates. Minor revisions in sections 1-10.
09/20/2024		Incorporated AAUS 2024 updates. Updated wording in section 8 to include both examining and supervising physicians. Minor edits of section 3, diver status maintenance.
03/20/2026		Incorporated AAUS 2025 updates. Removed Dive Control Board member list. Question list in 1.1.1 revised to guidelines. Updates to section 2.1.1, created section 2.1.2.1 Recreational Diver Certification. Minor updates to section 2.1.3. Major update to section 2.1.5, created 2.1.5.2 Working Diver Swimming Evaluation. Created section 3.1.1 Recreational Diver. Updated section 5.5.7. Minor updates to section 7.2.1. Minor update to Appendix 8.C
07/12/2026		Major updates to section 5.1 Breath-Hold Diving. Created section 7.3 Auxiliary Equipment, moved some sections of 7.2 Support Equipment to section 7.3. Major updates to 12.0 Glossary.

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Section 1.0

General Provisions

1.0 GENERAL PROVISIONS

1.1 SCOPE

The following rules and regulations apply to all individuals who dive under the auspices of Texas A&M University–Corpus Christi (TAMU-CC or University) regardless of the geographic location or the specific underwater tasks performed. They apply to all individuals, regardless of ownership, who may use for any purpose, diving equipment or apparatus, during TAMU-CC sponsored activities, diving at TAMU-CC facilities or from TAMU-CC vessels.

1.1.1 Working vs. Scientific Dives

The Dive Safety Officer, Diving Control Board, or designee, will be responsible for determining whether dive operations are conducted under working or scientific guidelines as defined by OSHA in CFR 1910.401(a)(2) (Section 11.0). This will be done by review of the Dive Plan (Section 4.23). The following criteria can be used to help distinguish between working and scientific dives. A negative answer to any of the following questions may require the task to be conducted as a working dive, by divers of Working Diver status (Section 3.1.3), and pursuant to the standards outlined in this manual.

(a) Can the tasks be accomplished using simple hand tools (e.g. small hammers, pliers, chisels, wrenches, cameras, measuring tapes, nets, collection jars) weighing 25 pounds or less underwater?
(b) Do the tasks require the expertise of a scientist or scientist in training?
(c) Can the tasks be accomplished with minimal physical exertion?
(d) Can the tasks be accomplished in short time (e.g., <1-hour)?
(e) Are the tasks limited solely to the observation of natural phenomena or responses of natural systems and/or gathering of data for scientific analysis?
(f) Objects to be lifted or moved, have underwater weight <100 pounds?
(g) Will the tasks result in the advancement of science?

NOTE: When conducting mixed operations (i.e., dives involving both working and scientific tasks), or when in doubt as to the nature of the dive (e.g., scientific versus working), the dive will be conducted as a working dive per this manual.

1.1.2 Training and Certification

Individuals are not authorized to dive under university auspices until they meet the requirements for diving pertinent to the level of the proposed activity as outlined in this manual and granted dive status by the Diving Control Board and/or Diving Safety Officer.

1.1.3 Equipment

All diving under university auspices will be done with equipment that conforms to the standards set forth in Section 7.0 of this manual regardless of ownership.

1.1.4 Revocation of Diving Permission

TAMU-CC may revoke dive privileges for failure to comply with any regulation contained herein, or non-compliance with any pertinent regulations or laws.

1.2 PURPOSE

1.2.1 The Dive Safety Program

The purpose of the dive safety program is to:

(a) Ensure the safety of all divers participating in associated programs at TAMU-CC and take all reasonable actions to facilitate the safe and effective participation of scientists and student researchers in diving activities necessary for research or educational purposes.
(b) TAMU-CC will provide training options for both divers who wish to meet the minimum training requirements pertinent to the level of the proposed diving activity, as outlined in the TAMU-CC Diving Standards for Underwater Operations manual, and divers wishing to develop new skills and build on ones already learned.
(c) Ensure all diving under the auspices of TAMU-CC is conducted in a manner most likely to minimize the risk of injury or occupational illness by complying with standards of safety established by nationally recognized agencies.

(d) Set forth rules, regulations, and standards for training and certification allowing compliance with the Occupational Safety and Health Administration (OSHA) standards for Commercial Diving Operations (29 CFR 1910 Subpart T).
(e) Set standards for the establishment of an American Academy of Underwater Sciences (AAUS) recognized scientific diving program, organization for the conduct of this program, and basic regulations and procedures for safety in TAMU-CC scientific dive operations. Observance of these standards establish a framework for reciprocity between other institutions, state and federal agencies, Aquariums and Zoos, and AAUS member organizations engaged in scientific diving that adhere to these minimum standards.

1.2.2 The Safe Practices Manual - TAMU-CC Diving Standards for Underwater Operations

TAMU-CC's Safe Practices Manual is titled *TAMU-CC Diving Standards for Underwater Operations*. TAMU-CC will maintain copies of this manual, via the Diving Control Board and Diving Safety Officer (Sections 1.3.2.7 and 1.3.3.2 respectively), OSHA's Commercial Diving Standards (29 CFR1910 Subpart T), and AAUS's Standards for Scientific Diving, and make them available at the dive location and to each dive team member.

The purpose of the TAMU-CC Diving Standards for Underwater Operations manual is to document basic dive policy, organization, regulations, and procedures for all TAMU-CC related dive operations including, but not limited to, the following:

(a) Establishing emergency response, evacuation, and medical treatment procedures for fire, equipment failure, and adverse environmental conditions.
(b) Setting criteria for diver training and certification.
(c) Outline general safety procedures and checklists for all TAMU-CC related dive operations.
(d) Determining assignments and responsibilities of dive team members.
(e) Establishing equipment and maintenance procedures and checklists.

1.2.3 Supplementary University Guidelines or Manuals

Diving conducted under the auspices of TAMU-CC will comply with the TAMU-CC Standards and Operations Manual regulations. For any dive related operation not specifically addressed in the TAMU-CC Manual, final interpretation of conflicting or unclear standards will fall to OSHA Standard 29 CFR 1910 Subpart T, *Commercial Diving Operations* (Section 11.0), and AAUS's *Standards for Scientific Diving* (Section 12.0), or Association of Dive Contractors International (ADCI) *International Consensus Standards for Commercial Diving and Underwater Operations*.

An immediate judgment may be provided by the Diving Safety Officer until the Diving Control Board can meet, review, and make a final ruling on said conflict.

All TAMU-CC dive operations will aspire to meet the higher standard as established by national regulations, OSHA recognized associations, and/or the individual requirements determined by the Dive Plan.

1.2.4 Consequences of Violations of Regulations

It is TAMU-CC's obligation to comply with the Commercial Diving Operation standards outlined by OSHA and, as an organizational member of AAUS, their Standards for Scientific Diving. Failure to meet these guidelines can result in suspension of all diving related operations and in some case, fines may be levied. Failure to comply with these procedures may also be cause for revocation or restriction of TAMU-CC's Organizational Member status, as recognized by AAUS. Therefore, if an individual fails to comply with TAMU-CC diving regulations, the TAMU-CC Diving Control Board may elect to restrict or revoke their dive status.

1.3 AUTHORITY AND RESPONSIBILITY

1.3.1 Diving Control Board (DCB)

1.3.1.1 Ultimate Authority

The DCB per OSHA CFR 1910, Subpart T, will exercise autonomous and absolute authority over all TAMU-CC dive operations.

1.3.1.2 General

The DCB:

(a) Is an appointed board of representatives from TAMU-CC's colleges, research institutes, and departments.

(b) Has the authority to approve and monitor diving projects; review and revise the diving safety manual; assure compliance with the manual; certify the depths to which a diver has been trained; take disciplinary action for unsafe practices; and, assure adherence to the buddy system (a diver is accompanied by and is in continuous contact with another diver in the water) for SCUBA diving.

(c) Must meet no less than quarterly and on an as-needed basis to address time sensitive issues.

1.3.1.3 Composition and Qualifications

The DCB:

(a) Consists of two groups: voting members, and non-voting advisors.

(b) Voting members:

(1) Must include the Responsible Administrative Officer, or designee, the DSO, and other representatives of the dive program.

(c) Non-voting advisors:

(1) Are appointed individual advisors or advisory panels with subject matter expertise to provide additional information.

(2) Must be appointed by majority vote of the DCB.

(d) Voting and non-voting members may delegate an alternative member that can conduct official business in the absence of the member. Alternates to the DCB will be voted and approved by the DCB prior to them conducting official business.

(e) Must consist of a majority of active scientific divers.

(f) Must be chaired by a voting member, preferably the Dive Safety Officer.

(g) A secretary will be chosen by the Chairperson to assist the DCB administratively.

1.3.1.4 Selection

(a) Seats on the DCB can be created or absolved by majority vote. Any member of the DCB will be appointed by majority vote. Current or prospective members will be proposed by the DSO or DCB member(s).

(b) The DSO or DCB will review the qualifications of the prospective member.

(c) Final approval to accept potential appointees will be approved by a DCB vote.

1.3.1.5 Decision Making Process

(a) The Chairperson will strive for consensus on all issues and decisions, and every attempt will be made to query each member of the board on all decisions.

(b) A quorum of two-thirds of the voting members must be present, in person or electronically, to conduct official business.

(c) Decisions will be made by majority vote with the Chairperson casting the deciding vote in case of a tie.

(d) Major objections to majority votes will be made part of the meeting minutes. Any voting member of the board may request that an item be

raised to the President via written communication from the Responsible Administrative Officer and Chair.

1.3.1.6 Term Limits

(a) The Responsible Administrative Officer/Designee and DSO are non-rotating members of the DCB.
(b) All other members may serve a maximum of five consecutive years.
(c) It is preferred no more than one member rotates off the DCB annually.
(d) Representatives of groups that do not have viable members to serve after a term-limit expiration may apply to serve additional terms.

1.3.1.7 Responsibilities

The DCB has the responsibility to:

(a) Establish additional standards, protocols, and operational procedures beyond the AAUS minimums to address OM specific needs and concerns.
(b) Review and revise the TAMU-CC Diving Standards for Underwater Operations and Operations manual and assure total compliance.
(c) Approve and monitor dive projects.
(d) Ensure the TAMU-CC dive program and projects are covered by the appropriate institutional insurance (Section 1.5).
(e) Establish and/or approve training programs through which applicants for dive status can satisfy the requirements of this manual.
(f) Take disciplinary action for unsafe dive practices, and act as a board of appeal to consider diver-related problems.
(g) Approve locations where diving may be conducted under university auspices.
(h) Establish criteria for equipment selection and use, and recommend new equipment and techniques for university use.
(i) Establish and/or approve facilities for the inspection and maintenance of all scuba and associated equipment (including gas stations and quality standards).
(j) Suspend dive programs considered unsafe or unwise.
(k) Act as official representative of TAMU-CC in matters concerning the diving program.
(l) Recommend the issue, re-issue, and revocation of diving certifications.
(m) Screen and appoint all personnel involved in diving instruction under the auspices of TAMU-CC.
(n) Act as official representative of TAMU-CC when recommending policy changes and amendments to AAUS, in scientific diving matters.
(o) Sit as a board of investigation to inquire into the nature and cause of diving accidents or violations of TAMU-CC Diving Standards for Underwater Operations Manual.
(p) Periodically review the DSO's performance.
(q) Certify the depths to which a diver has been trained and buddy system will be adhered to.

1.3.2 Diving Safety Officer (DSO)

The DSO will hold a broad knowledge base in all aspects of diving and diving technology. The DSO will possess a broad technical and scientific expertise in research and research related diving. The DSO's level of knowledge and diving skills will span the reach of TAMU-CC's dive program, qualifying them to perform any aspect of program operation.

1.3.2.1 Qualifications

The DSO must:

(a) Be appointed by the President of Texas A&M University–Corpus Christi or the designated representative (i.e. Responsible Administrative Officer or designee) with the advice of the DCB.
(b) Be a TAMU-CC employee who is an active scientific diver.
(c) Be a full member of AAUS.
(d) Be an active underwater instructor from an internationally recognized agency.
(e) Attend an AAUS DSO Orientation within one year of accepting a position as a TAMU-CC DSO, unless he/she has served as a DSO for another current AAUS OM within the last year.

1.3.2.2 Responsibilities

The DSO:

(a) Will serve as Chairman of the DCB, and as such, will prepare recommendations for consideration by the DCB.
(b) Will be responsible, although guided in the performance of the required duties by the advice of the DCB, for the conduct of the TAMU-CC dive program. The routine operational authority for this program, including the conduct of training and certification, approval of dive plans, maintenance of dive records, ensuring compliance with this standard, and all relevant regulations, rests with the DSO.
(c) May assign qualified individuals to carry out portions of the dive program, but cannot delegate responsibility for its safe conduct.
(d) Will provide annual audits of all dive program records pertaining to safety and instructional standards.
(e) Will prepare and submit annual reports of university dive activities as required.
(f) Has the authority to suspend dive programs deemed unsafe.
(g) Must be guided in the performance of the required duties by the advice of the DCB, but operational responsibility for the conduct of the scientific diving program will be retained by the DSO.

1.3.3 Instructional Personnel

All non-university personnel involved in dive instruction, training, and operational oversight under the auspices of TAMU-CC will:

(a) Be qualified for the position.
(b) Instruct under the standards of an internationally recognized dive training agency or under the minimum guidelines presented by the most current version of the RSTC/ISO Entry Level Diver Standards.
(c) Be screened and approved by the DCB prior to service.

1.3.4 Reciprocity and Visiting Scientific Divers

Regarding reciprocity and visiting divers, the following will apply:

(a) If TAMU-CC engages jointly in dive activities with other Organizations/Facilities, or engages jointly in the use of diving resources, one of the participating Diving Safety Boards will be mutually agreed upon to govern the joint dive project. However, responsibility for individual divers ultimately resides with the home OM.
(b) A diver from another Organization/Facility may apply for permission to dive under the auspices of TAMU-CC.

The diver:

(1) Will submit to the DSO a letter of reciprocity, or a completed Appendix 1.A, signed by the Diving Officer or Chair of their home DCB.
(2) Prior to participation, the visiting diver may be asked to:
    (i) Provide further documentation as outlined in Section 3.1.2 Temporary Diver.
    (ii) Demonstrate their knowledge of diving.

(iii) Demonstrate diving skills.

(3) If denied permission to dive, the TAMU-CC DSO will notify the diver and their home DCB with an explanation of all reasons for the denial.

1.4 Waiver of Requirements

The DCB or the DSO may grant a waiver for specific requirements of training, examinations, depth certifications, and minimum activity to maintain dive status. If the diver's entry-level training was not under the control of TAMU-CC, the DSO or designee may evaluate the diver and verify they possess knowledge and skills substantially similar to those stated above. AAUS medical standards may not be waived.

1.5 Diving Accident Insurance

TAMU-CC requires all divers engaging in diving activities under the auspices of TAMU-CC to personally obtain a supplemental diving accident insurance policy (e.g. coverage by Divers Alert Network)and ensure it is in effect during periods of diving activity.

1.6 Staff Liability

To the degree allowed by state law employees acting or diving in an official capacity while in course and scope of employment will be supported and protected against claims of liability.

APPENDIX 1.A

DIVE RECIPROCITY FORM

This letter is to confirm the standing of _____ as a Diver with Texas A&M University - Corpus Christi (TAMUCC). TAMUCC adheres to the standards set forth by OSHA CFR 1910 and as an Organizational Member of the American Academy of Underwater Sciences (AAUS), their standards governing Scientific Diving. The Diver's standing in the TAMUCC Dive Program follows:

Diver Authorization: Status _____ Approval Date _____

Active in the TAMUCC Program since _____

This Dive Status is presently: In-Active

This Diver's depth certification is presently: _____

Diver's Emergency Contact	Relationship	Phone	Phone (alternate)
Brett W. Dodson	Dive Safety Officer	361-825-3086	678-938-6380

Requisite Training:	Agency	Certification Date	Level	Expires
First Aid				
Adult CPR				
AED				
O2 Provider				
Neuro Assessment				
Blood Borne Path.				
Other				
Dive Insurance				

AAUS Individual Member? ____ Yes ____ No

Medical Exam Date _____ Expiration Date _____

Highest Level Diving certification:	Level	Agency	Date

Additional Diving Authorizations and experience:

____	Science	____	Software	____	Temperate	____	Night
____	Working	____	Ocean	____	Cold	____	Research
____	Training	____	Fresh	____	Ice	____	Collecting
____	Proficiency	____	Open water	____	Cave/rn	____	Photography
____	Recreation	____	Confined	____	Wreck	____	Navigation
____	SCUBA	____	Shore	____	Dry suit	____	Altitude
____	Surf. Sup.	____	Boat	____	Full Face Mask	____	Search/recovery
____	Rebreather	____	Platform	____	Hard Hat	____	Rescue
____	Hookah	____	Buoyed DL.	____	Communications	____	Decompression
____	Nitrox	____	Free Descent	____	Low visibility	____	Blue water
____	Trimix	____	Bottom Orient.	____	Current	____	Saturation
____	Tables	____	Water Column	____	Oil/Gas Rig	____	Aquarium
____	Computer	____	Tropical	____	Artificial Reef	____	Other _____

Diving Activity: Date of last dive _____ Number of dives in past 12-months _____

Date of last Diving Emergency Managment session attended _____

Equipment Service:	Manufacturer	Serial Number	Service Date	Expires
Regulator				
First Stage				
Second Stage				
Back-up				
Buoyancy Comp.				

Diving Officer's Comments:

Project Description, Location, Dates:

This document is verification of diver training and current standing only. It does not verify employment status with,

Best Regards,

_____ Date: _____

Dive Safety Officer Office Phone: _____

Email: _____

Section 2.0

Training and Certification Requirements

2.0 ENTRY LEVEL TRAINING REQUIREMENTS

2.1 ELIGIBILITY

This section describes, in order, the entry-level training requirements a diver or prospective diver applicant will need before their application for TAMU-CC diver-in-training status (Section 3.0) is considered complete.

2.1.1 Application

To participate in the TAMU-CC diving program, a diver or prospective diver will submit a complete application. The following guidelines apply:

(a) Application will be made to the DSO on the form prescribed by TAMU-CC policy (see Appendix 2.A or, in a case of reciprocity, a letter of reciprocity or Appendix 1.A).

(b) Only employees and students of TAMU-CC may apply for, and participate in, entry-level dive training under the auspices of the University. Applications will be considered on a case-by-case basis. Instructors will meet the criteria outlined in Section 1.3.4 and 2.2.

(c) University and non-university personnel may participate in advanced dive activities on a continuing education basis with permission of the DCB and/or the DSO.

NOTE: An applicant for dive status will be at least eighteen (18) years of age.

2.1.2 Diver Certification

The Applicant must, at a minimum, show documented proof of entry-level diver certification from an internationally recognized training agency or the minimum guidelines presented by the most current version of the RSTC/ISO Entry Level Diver Standards.

2.1.2.1 Recreational Diver Certification

TAMU-CC students and employees can complete the entry-level diver certification provided by TAMU-CC. Below are the requirements for prospective divers to enter dive training to earn the entry-level diver certification:

(a) Prospective TAMU-CC divers who are employees seeking the entry-level diver certification as part of their job duties will complete all prerequisites and requirements as outlined in this manual.

(b) Prospective TAMU-CC divers who are not employed or planning to become TAMU-CC employees with diving as part of their employment may enter the dive program as recreational divers (see section 3.1.1).

(c) Recreational divers will follow the entry level requirements in section 2.0 with the following exceptions:

(1) Divers will submit a medical form published by the current World Recreational Scuba Training Council instead of the medical evaluation outlined in 2.1.3 if entering as a non-employed Recreational Diver (see 3.1.1).

(2) Employees completing the entry-level certification as part of their employment will complete all entry level requirements outlined in this manual including 2.1.3 Medical Evaluation.

(3) Non-employed recreational divers will not be required to complete the swimming evaluation outlined in 2.1.5 and will instead adhere to the entry level scuba certification requirements outlined by the World Recreational Scuba Training Council and International Standards Organization.

2.1.3 Medical Evaluation

To participate in the scientific/working TAMU-CC diving program, a diver or prospective diver will submit a complete medical evaluation prior to any in-water activity (Section 8.0 and Appendix 8.A-D). This evaluation will include:

(a) A Diving Medical Exam Overview filled out and signed by the DSO and presented to the physician prior to the exam.

(b) A Medical Evaluation Report of Fitness completed, signed, and dated by a licensed physician, based on an approved medical examination attesting to the applicant's fitness for diving.
(c) A Release of Medical Information Form signed and dated by the applicant.
(d) A Diving Medical History Form filled out and signed by the applicant and presented to the physician prior to the exam.

2.1.4 Liability Release Waiver

To participate in the TAMU-CC diving program, a diver or prospective diver will submit the required liability release form prior to participation in training, research, or recreational diving under the auspices of TAMU-CC (Appendix 2.B).
The DSO may require additional releases and waivers depending on the training activity. Such forms, if required, will be approved by the DCB and submitted prior to participation in the activity.

2.1.5 Swimming Evaluation

Applicants will successfully demonstrate they possess reasonable aquatic ability by performing the following swimming and skin diving skills, or their equivalent, in the presence of the DSO, or an examiner approved by the DSO

2.1.5.1 Scientific Diver Swimming Evaluation

(a) Swim underwater for a distance of 25 yards (23 m) without surfacing.
(b) Swim 400 yards (366 m) in less than 12 minutes, without swimming aids.
(c) Without the use of swimming aids, tread water for 10 minutes, or two minutes without the use of hands.
(d) Without the use of swimming aids, transport another person of equal size a distance of 25 yards (23 m) in the water.

2.1.5.2 Working Diver Swimming Evaluation

(a) Swim underwater for a distance of 25 yards (23 m) without surfacing.
(b) Swim 550 yards (503 m) in less than 15 minutes, without swimming aids.
(c) Swim 200 yards (183 m) using mask, fins, and snorkel.
(d) Without the use of swimming aids, tread water for 30 minutes without the use of swimming aids.
(e) Without the use of swimming aids, transport another person of equal size a distance of 25 yards (23 m) in the water.

NOTE: All swimming and skin diving skills will be completed satisfactorily in a single session. If an applicant is unable to complete the tests, a retest can be scheduled no sooner than one month from the date of an incomplete test.

2.2 Additional Training Requirements

Each applicant for dive status through TAMU-CC will hold current certifications, or the equivalent, in:

(a) Standard First Aid.
(b) Cardiopulmonary Resuscitation (Adult CPR and AED).
(c) Field Neurological Exam.
(d) Oxygen Provider certifications.
(e) Hold a current diving accident insurance policy as addressed in (Section 1.5)

APPENDIX 2.A

DIVE PROGRAM APPLICATION

Dive Status:

Relationship to organization (Faculty, Staff, Student, Visitor) _____

Original AAUS dive authorization from _____ Date _____

Active in the TAMUCC Program since _____

This Dive Status is presently _____

This Diver's depth certification is presently: _____

Classification:	Application Date	Date of Status Approval
Applicant		
Scientific Diver-in-Training		
Scientific Diver		
Working Diver		
Temporary Diver		

Personal Information:

Name _____ Birth Date _____ Age _____

Address _____ E-mail _____

City _____ State _____ Zip _____

Telephone _____ Telephone (Alt) _____

Emergency Contact _____ Relationship _____

Address _____ E-mail _____

City _____ State _____ Zip _____

Telephone _____ Telephone (Alt) _____

Diving certifications: List Highest to lowest.

Agency	Certification Level	Certification Date	Certification #

Ancillary Diving Certifications:

	Agency	Certification Date	Level	Expires
First Aid				
Adult CPR				
AED				
O2 Provider				
Neuro Assessment				
Blood Borne Path.				
Other				
Other				
Dive Insurance				

AAUS Individual Member? Yes _____ No _____

Medical Exam Date _____ Expiration Date _____

Diving Activity:

Date of last dive					Last Diving Accident Management session attended								
Years diving					Total hours underwater					Greatest depth			
Total number dives							Number of dives in past 12-months						
Total dives to:	0-30		31-60		61-100		101-130		131-150		151-190		>190
Time at depth:	0-30		31-60		61-100		101-130		131-150		151-190		>190
Dive locations													

Diving experience: One X for some experience, 2X's if greater, 3X's if certified.

	Science		Software		Temperate		Night
	Working		Ocean		Cold		Research
	Training		Fresh		Ice		Collecting
	Proficiency		Open water		Cave/rn		Photography
	Recreation		Confined		Wreck		Navigation
	SCUBA		Shore		Dry suit		Altitude
	Surf. Sup.		Boat		Full Face Mask		Search/recovery
	Rebreather		Platform		Hard Hat		Rescue
	Hookah		Buoyed DL.		Communications		Decompression
	Nitrox		Free Descent		Low visibility		Blue water
	Trimix		Bottom		Current		Saturation
	Tables		Water. Col.		Oil/Gas Rig		Aquarium
	Computer		Tropical		Artificial Reef		Other

Additional experience: Describe diving experience not covered above.

Equipment owned:	Manufacturer	Serial Number	Service Date	Expires
Regulator				
First Stage				
2nd Stage				
Back-up 2nd				
Buoyancy Comp.				
Dry Suit				
Pressure gauge				
Depth gauge				
Computer				
Cylinder				
VIP				
HYDRO				
Cylinder				
VIP				
HYDRO				

Fill out w hen personal equipment w ill be used for TAMUCC sanctioned diving. Consult DSO for instructions on adding additional pieces of equipment. Personal equipment used on TAMUCC sanctioned diving is subject to the same rules and regulations required of facility ow ned equipment, i.e. configuration, compatibility, and maintenance. The DSO w ill be informed if one personal item is to be sw apped out w ith another personal item. The exchange w ill be recorded and filed in Diver's file.

APPENDIX 2.B

WAIVER, INDEMNIFICATION, AND MEDICAL TREATMENT AUTHORIZATION FORM

Texas A&M University - Corpus Christi

EXCULPATORY CLAUSE. In consideration for receiving permission to participate in any and all activities of **Diving** (herein referred to as "activity"), which is sponsored by **Texas A&M University – Corpus Christi** (herein referred to as "sponsor"), a member of The Texas A&M University System, I hereby release, waive, discharge, covenant not to sue, and agree to hold harmless for any and all purposes sponsor, The Texas A&M University System, the Board of Regents for The Texas A&M University System, and their members, officers, servants, agents, volunteers, or employees (herein referred to as RELEASEES or INDEMNITEES) from any and all liabilities, claims, demands, injuries (including death), or damages, including court costs and attorney's fees and expenses, that may be sustained by me while participating in such activity, while traveling to and from the activity, or while on the premises owned or leased by RELEASEES, ***including injuries sustained as a result of the sole, joint, or concurrent negligence, negligence per se, statutory fault, or strict liability of RELEASEES.*** I understand this waiver does not apply to injuries caused by intentional or grossly negligent conduct.

INDEMNITY CLAUSE. I am fully aware that there are inherent risks to myself and others involved with this activity, including but not limited to:

Barotraumas, Drowning, Asphyxiation, Hyperthermia, Hypothermia, and Type I & II Decompression sickness

and I choose to voluntarily participate in said activity with full knowledge that the activity may be hazardous to me, my property, and to the person and property of others. I acknowledge there may be physically strenuous activities. I know of no medical reason why I should not participate. ***I agree to indemnify and hold harmless INDEMNITEES*** from any and all liabilities, claims, demands, injuries (including death), or damages, including court costs and attorney's fees and expenses, which may occur to myself, other participants, and third-persons as a result of my participation in said activity, ***including injuries sustained as a result of the sole, joint, or concurrent negligence, negligence per se, statutory fault, or strict liability of INDEMNITEES.***

NO INSURANCE. I understand that RELEASEES do not maintain any insurance policy covering any circumstance arising from my participation in this activity or any event related to that participation. As such, I am aware that I should review my personal insurance coverage. Sponsor does not carry general liability insurance to cover claims arising from this activity so it seeks a waiver of claims as additional consideration for the right to participate so sponsor, a governmental unit of the State of Texas, can (a) provide the activity at the lowest possible cost to participants; and (b) provide access to a greater number of participants by expending limited resources on program materials rather than on liability insurance.

BINDS HEIRS. It is my express intent that this agreement shall bind the members of my family and spouse, if I am alive, and my heirs, assigns and personal representatives, if I am deceased, and shall be governed by the laws of the State of Texas.

MEDICAL AUTHORIZATION, INDEMNITY FOR MEDICAL EXPENSES, and WAIVER. I understand RELEASEES cannot be expected to control all of the risks articulated in this form and RELEASEES may need to respond to accidents and potential emergency situations. Therefore, I hereby give my consent for any medical treatment that may be required, as determined by a medical professional at the medical facility, during my participation in this activity with the understanding that the cost of any such treatment will be my responsibility. I agree to indemnify and hold harmless INDEMNITEES for any costs incurred to treat me, even an INDEMNITEE has signed hospital documentation promising to pay for the treatment due to my inability to sign the documentation. I further agree to release, waive, discharge, covenant not to sue, and agree to hold harmless for any and all purposes, RELEASEES from any and all liabilities, claims, demands, injuries (including death), or damages, including court costs and attorney's fees and expenses, that may be sustained by me while receiving medical care or in deciding to seek medical care, including while traveling to and from a medical care facility, including injuries sustained as a result of the sole, joint, or concurrent negligence, negligence per se, statutory fault, or strict liability of RELEASEES. I understand this waiver does not apply to injuries caused by intentional or grossly negligent conduct.

VOLUNTARY SIGNATURE. In signing this agreement I acknowledge and represent that I have read it, understand it, and sign it voluntarily as my own free act and deed; sponsor has not made and I have not relied on any oral representations, statements, or inducements apart from the terms contained in this agreement. I execute this document for full, adequate, and complete consideration fully intending to be bound by the same, now and in the future. **For students engaging in extracurricular activities:** I understand I can choose not to sign this document and free myself from its terms and the associated risks of the activity by simply not participating in the activity and choosing some other activity available to me that has a lower level of risk to me. I further understand this is a voluntary, extracurricular activity; therefore it is not required for me to obtain college credits and not participating in this activity will in no way hinder my ability to obtain a degree from the university. **For students going on fieldtrips or other class-related activities:** I understand participation in this class/fieldtrip/activity is not mandatory and I will not be penalized for failing to participate in this activity because an alternative activity exists for which I can receive like credit. While I understand alternative activities are available to me that do not have the risks associated with this activity I still desire to voluntarily engage in this activity.

SIGNING THIS DOCUMENT INVOLVES THE WAIVER OF VALUABLE LEGAL RIGHTS. CONSULT YOUR ATTORNEY BEFORE SIGNING THIS DOCUMENT.

☐ **By placing an "X" this box I agree to the terms of this agreement.**

SIGNED this _____ day of _____, 20 ____

Printed Name _____

Participant's Date of Birth _____

Parent or Legal Guardian Signature _____
(If Participant is under 18 years old)

Parent or Legal Guardian Printed Name _____
(If Participant is under 18 years old)

INSTRUCTIONS: (1) The document should be printed in a font size no smaller than 10-point type. This is 10-point type. This is 12-point type. (2) The formatting/font style (***bolded, underlined, and italicized***) in paragraph nos. 1, 2, 5 & 6 should not be altered.

TAMUS-OGC-Approved 08/29/2006

Section 3.0

Diver Status

3.0 DIVER STATUS

An approved TAMU-CC diver certification classification is required by all persons diving under the auspices of TAMU-CC. Formal application (Appendix 2.A) will be made when a diver enters the dive program. The diver will be granted the level of certification classification when all requirements for that classification are met.

NOTE: Submission of documents and participation in aptitude examinations does not automatically result in certification. The applicant must convince the DCB and DSO that they are sufficiently skilled and proficient to be certified. This skill will be acknowledged by the approval of the DCB and DSO. Applicants who do not possess the necessary judgment, under diving conditions, for the safety of themselves and others may be denied organizational member scientific diving privileges.

3.1 CLASSIFICATION

3.1.1 Recreational Diver

Recreational divers may enter the TAMU-CC dive program and dive under the auspice of TAMU-CC for training purposes only. Once divers have earned the entry-level diver certification they will no longer be under the auspice of the TAMU-CC dive program. TAMU-CC employees seeking the entry-level certification as part of their job function will be classified as Diver-in-Training (see 3.1.2) and then as either a Scientific Diver (see 3.1.3) or Working Diver (see 3.1.4).

3.1.1.1 Certification Process

Recreational divers will earn the entry-level diver certification by completing TAMU-CC training courses in accordance with the standards set forth by the World Recreational Scuba Training Council and International Standards Organization.

3.1.2 Diver-in-Training (DIT)

This is an authorization to dive, usable only while it is current and for the purpose intended. This authorization signifies that a diver has completed the requirements in section 2.0, as approved by the DCB. DIT status must only be used when the diver is on his/her way to becoming certified as a Scientific Diver. While it is recommended for DIT's to have hands-on scientific diver experience during their training, the DIT status is intended to be a temporary authorization, not a substitute for Scientific Diver Certification.

3.1.3 Scientific Diver Status (SD)

To participate in the scientific dive program as a SD, one will complete the requirements outlined in section 3.1.2.1 and show an aquatic ability sufficient to perform job duties the title may demand in both confined and open-water scenarios. Submission of documents and participation in aptitude examinations does not automatically result in certification. To be certified, the applicant must demonstrate to the DCB, through the DSO, that s/he is sufficiently skilled and proficient, and possess the necessary judgement for their safety and/or that of the dive team. This is a permit to dive as authorized by and under the auspices of TAMU-CC pursuant to the provisions of this standard, and is only usable while current and for the purpose intended.

3.1.3.1 Certification Process

An applicant for SD status will successfully meet the following criteria:

(a) Hold a current DIT certification (Section 3.1.1) signifying that a diver has met the items outlined in Section 2.0.

(b) Complete a minimum of 100 hours of theoretical training, knowledge development, practical training and skill development. Theoretical aspects will include principles and activities appropriate to the intended area of scientific study.

(c) Theoretical Training/Knowledge Development

(1) Required topics (include, but are not limited to):

(i) Diving emergency care training, including first aid, CPR, oxygen administration, recognition of

decompression sickness and arterial gas embolism, accident management, and field neurological exams.

(ii) Dive rescue.
(iii) Dive physics.
(iv) Dive physiology.
(v) Dive environments.
(vi) Decompression management tools (dive tables, dive computers, PC based software), theory, and application.
(vii) OSHA and other applicable governmental diving regulations.
(viii) AAUS scientific diving regulations and history as it pertains to scientific dive planning and coordination with other agencies.
(ix) Scientific method.
(x) Data gathering techniques specific to area of study including but not limited to transect sampling, transecting, mapping, coring, photography, archaeology, tagging, collecting, animal handling and identification, behavior and ecology, site selection, location and re-location, and specialized training for equipment incorporation into the prescribed dive operation.
(xi) Hazardous materials training with topics on high-pressure cylinders, chemical hygiene, and laboratory safety.
(xii) Hazards of breath-hold diving and ascents.

(2) Suggested topics (included, but not limited to):

(i) Surface-supplied and open circuit diving.
(ii) Small boat operation.
(iii) Closed and semi-closed circuit re-breathers.
(iv) Use of air-alternative gas technologies, e.g. NITROX and mixed-gas (Section 5.5).
(v) Specialized diving environments and conditions, e.g. blue water, zero visibility, decompression, overhead, night diving, cold water diving, polluted water, Aquarium diving, potential entanglement, diving in strong current., live boating, kelp Diving, saturation diving, etc.
(vi) Specialized diving equipment such as dry suits, full-face masks, and communications.

(d) Practical Training/Skill Development

(1) Confined Water Evaluation: The applicant will demonstrate in a manner acceptable to the DSO or Instructor, the ability to perform the following in a swimming pool or sheltered water:

(i) Enter the water with full equipment.
(ii) Clear face mask.
(iii) Demonstrate proficiency in buddy breathing and the use of an alternate air source with and without a mask.
(iv) Demonstrate the ability to alternate snorkel and scuba while swimming.
(v) Demonstrate an understanding of underwater signs and signals.
(vi) Demonstrate simulated in-water mouth-to-mouth resuscitation.

(vii) Rescue and transport, as a diver, a passive simulated victim of an accident.
(viii) Demonstrate the ability to remove and replace equipment while submerged.
(ix) Demonstrate a level of comfort in the water acceptable to the instructor.

(2) Open-water Evaluation: The Applicant will satisfy the DSO or instructor of their ability to perform the following in an open-water environment:

(i) Surface dive to a depth of about 10 feet (4.5 m) without scuba.
(ii) Demonstrate ability to clear mask and regulator while submerged.
(iii) Demonstrate proficiency in air sharing as both donor and receiver.
(iv) Enter and leave the water wearing full scuba equipment.
(v) Leave and board a diving vessel while wearing full scuba equipment.
(vi) Kick 400 yards (364 m) while wearing scuba gear, but not breathing from the scuba unit.
(vii) Compute their own surface gas consumption (SAC) rate in cubic feet/minute for each training dive.
(viii) Demonstrate the ability to achieve and maintain neutral buoyancy at the surface and below the surface.
(ix) Demonstrate techniques of self-rescue and buddy assistance.
(x) Demonstrate knowledge and ability to make a simulated emergency swimming ascent from a depth of 20 feet.
(xi) Navigate underwater
(xii) Demonstrate knowledge and ability to plan and execute a dive.
(xiii) Demonstrate the ability to maneuver efficiently in the environment, at and below the surface.
(xiv) Showing judgment consistent with safe diving practices will be demonstrated at all times, both above and below water.
(xv) Communicate effectively underwater.
(xvi) Rescue from depth and transport 25 yards (23 meters), as a diver, a passive simulated victim of an accident: surface diver, establish buoyancy, stabilize victim
(xvii) Demonstrate simulated in-water mouth-to-mouth resuscitation
(xviii) Removal of victim from water to shore or boat
(xix) Stressed and panicked diver scenarios
(xx) Recommendations For Rescue Of A Submerged Unresponsive Compressed-Gas Diver – Appendix X.

(3) Checkout Dives: Practical training must include Open Water checkout dive(s), with an evaluation of the skills listed in Open Water Evaluation by the DSO or qualified delegate followed by at least 11 open-water dives in a variety of dive sites and diving conditions, for a cumulative bottom time of six hours. These dives must be supervised by a certified

Scientific Diver with experience in the type of diving planned, and with the knowledge and permission of the DSO. Depth progression must proceed shallower to deeper after acceptable skills and judgement have been demonstrated, and are not to exceed 100 feet (30 m) during the initial 12 dive cycle.

(e) Examinations

(1) Written: Before completing training, the trainee must pass a written examination that demonstrates knowledge of at least the following:

(i) Function, care, and use of diving equipment.
(ii) Physics and physiology of diving.
(iii) Diving regulations and precautions.
(iv) Applicable diving environments.
(v) Emergency procedures, including buoyant ascent and ascent by air sharing.
(vi) Currently accepted decompression procedures.
(vii) Demonstrate the proper use of dive tables.
(viii) Hazards of breath-hold diving and ascents.
(ix) Planning and supervision of diving operations.
(x) Navigation.
(xi) Underwater communications.
(xii) Aspects of freshwater and altitude diving operations.
(xiii) Diving hazards and mitigation.
(xiv) Cause, symptoms, and prevention of the following: near drowning, air embolism, carbon dioxide excess, squeezes, oxygen poisoning, nitrogen narcosis, exhaustion and panic, respiratory fatigue, motion sickness, decompression sickness, hypothermia, hypoxia/anoxia.
(xv) Suggested topics (3.1.2.1(d)(2)) at the DSO's discretion.

(2) Equipment: the trainee will be subject to examination//review of:

(i) Personal diving equipment.
(ii) Task specific equipment.
(iii) Function and manipulation of decompression computer to be employed by the diver (if applicable).

3.1.4 Working Diver Status (WD)

To participate as a WD under the auspices of TAMU-CC, one will show an aquatic ability sufficient to perform job duties the title may demand in both confined and open-water scenarios. This is a permit to dive as authorized by and under the auspices of TAMU-CC pursuant to the provisions of this standard, and is only usable while current and for the purpose intended.

3.1.4.1 Certification Process

An applicant for WD status will successfully:

(a) Hold a current SD permit signifying that a diver has met all of the criteria outlined in Section 3.1.2
(b) Make formal application for Working Diving Status to the DSO (Appendix 2.A).
(c) Swim Evaluation

(1) General

(i) All WD candidates will successfully pass the swim evaluation prior to undergoing further certification training.
(i) All swim evaluation skills will be demonstrated satisfactorily in a single session. If an applicant is unable to complete the evaluation, a reevaluation can be scheduled no sooner than one month from the date of an incomplete evaluation.

(2) Working diver swim evaluation requirements include:
(i) Swim 550 yards (503 m) on the surface without stopping in 15 minutes or less.
(ii) Swim 200 yards (183 m) using mask, fins, and snorkel.
(i) Swim 25 yards (23 m) underwater without surfacing and without pushing off from the wall of the pool.
(ii) Tread water for 30 minutes without any flotation aids.
(iii) Without swimming aids, transport another person of equal size a distance of 25 yards (23 m) in the water.

(d) Have on file, an annual statement from a licensed physician attesting to applicant's fitness for diving (Section 8.0).
(e) Complete training on specified diving procedures and protocols as required (i.e. specific training on use of tools and equipment commonly employed in the commercial diving field).

3.1.5 Scientific Aquarium Diver Certification

(a) Scientific Aquarium Diver is a certification authorizing the diver to participate in scientific diving solely in the aquarium environment. All requirements set forth for Scientific Diver certification must apply, except follows: Practical training must include at least 12 supervised aquarium dives for a cumulative bottom time of 6 hours.
(b) Training requirements for navigation and 400 yard (366 meter) surface swim in scuba gear may be waived.

3.1.6 Temporary Diver Permit

Issuance of this permit constitutes a waiver of the requirements outlined in Section 3.0 and will only follow a demonstration of the required proficiency in diving. It is only valid for a limited time, as determined by the DCB or the DSO. This permit is not to be construed as a mechanism to circumvent existing standards set forth in this standard. The DSO may waive requirements of this section if the person in question has demonstrated proficiency in diving and can contribute measurably to a planned dive. The applicant will:

(a) Make formal application for Scientific Diving Status to the DSO (Appendix 2.A) or in a case of reciprocity, a letter of reciprocity or a completed and signed Appendix 1.A.
(b) Provide a statement from a licensed physician, attesting to the applicant's fitness for diving (Appendix 8.A-D) or in a case of reciprocity, a letter of reciprocity or a completed and signed Appendix 1.A.
(c) Complete and sign a Release of Liability (Appendix 2.B).
(d) Possess and provide copies of their internationally recognized dive certificates.

3.2 DEPTH CERTIFICATIONS

3.2.1 General

(a) Indicates the maximum depth in which a diver can conduct science and may supervise other divers holding a lesser depth authorization.
(b) TAMU-CC divers may progress to the next depth level after successfully completing the required dives for the next level. Under these circumstances, the diver may exceed their depth limit. Dives will be planned and executed

under close supervision of a diver certified to this depth, with the knowledge and permission of the DSO. In some circumstances, the DSO may make depth status allowance based on a diver's past dive record prior to entering the TAMU-CC dive program.

(c) A diver's depth certification will expire six months from the date of the last logged dive to the certification depth. Status will be re-awarded after making a supervised successful dive to certified depth with the DSO or designee.

(d) Once the required certification requirements are met, a diver whose depth certification has lapsed due to lack of activity may be re-qualified by making a dive to that depth under the supervision of the DSO or designee who is actively certified to dive at this depth.

(e) A diver's Maximum Operating Depth (MOD) per a given gas mixture (Section 5.4) will be determined by a working PPO2 of ≤1.4, a resting PPO2 of ≤1.6, and an Equivalent Air Depth/Equivalent Narcosis Depth (EAD/END) of ≤130 feet.

(f) Dives requiring in-water decompression require pre-approval by the TAMU-CC DCB.

(g) In the event a diver within the OM does not hold an authorization at the desired next level, the DCB may authorize a required progression or procedure for a diver to attain a deeper authorization. If local conditions do not conform to traditional AAUS depth progressions, the DCB may devise a reasonable accommodation. However, the total number of dives to obtain a given depth authorization must follow the cumulative number of dives listed in section 3.2.2.

3.2.2 Depth Qualifications

(a) 30-foot Depth Certification

Thirty feet is the initial, permit level and will be approved upon the successful completion of training listed in Section 2.0 and 3.1.1. Cumulative supervised dives: 12.

(b) 60-foot Depth Certification

A diver holding a 30-foot depth certificate may be certified to a depth of 60 feet after successfully completing 12 dives to depths between 31 and 60 feet under supervision of a diver authorized by the DCB, for a minimum total time of 4 hours. Cumulative minimum supervised dives: 24.

(c) 100-foot Depth Certification

A diver holding a 60-foot depth certificate may be certified to a depth of 100 feet after successfully completing, six dives to depths between 61 and 100 feet under supervision of a dive buddy authorized by the DCB. The diver must also demonstrate proficiency in the use of the appropriate decompression profiling method. Cumulative minimum supervised dives: 30.

(d) 130-foot Depth Certification

A diver holding a 100-foot depth certificate may be certified to a depth of 130 feet after successfully completing, six dives to depths between 101 and 130 feet under supervision of a dive buddy authorized by the DCB. The diver must also demonstrate proficiency in the use of the appropriate decompression profiling method. Cumulative minimum supervised dives: 36.

(e) 150-foot Depth Certification

(f) A diver holding a 130-foot depth certificate may be certified to a depth of 150 feet after successfully completing, six dives to depths between 131 and 150 feet under supervision of a dive buddy authorized by the DCB. The diver must also demonstrate knowledge of the special problems of deep diving and of special safety requirements. Cumulative minimum supervised dives: 42.190-foot Depth Certification

A diver holding a 150-foot depth certificate may be certified to a depth of 190 feet after successfully completing, six dives to depths between 151 and 190 feet under supervision of a dive buddy authorized by the DCB. The diver must

also demonstrate knowledge of the special problems of deep diving and of special safety requirements. Cumulative minimum supervised dives: 48..

NOTE: Diving on air is not permitted beyond a depth of 190 feet. Dives beyond 190 feet require the use of mixed gas.

(g) Authorization to 250 Foot Depth - A diver holding a 190-foot authorization may be authorized to a depth of 250 feet after successfully completing and logging six supervised dives to depths between 191 and 250 feet under supervision of a dive buddy authorized by the DCB. The diver must also demonstrate knowledge of the special problems of deep diving and of special safety requirements.

(h) Authorization to 300 Foot Depth - A diver holding a 250-foot authorization may be authorized to a depth of 300 feet after successfully completing and logging six supervised dives to depths between 201 and 250 feet under supervision of dive buddy authorized by the DCB. The diver must also demonstrate knowledge of the special problems of deep diving and of special safety requirements.

(i) Authorizations deeper than 300 Feet – Depth authorizations deeper than 300 feet progress in 50-foot depth/6 dive increments. A diver holding a 300 foot, or deeper authorization may be authorized to the next depth authorization increment after successfully completing and logging six supervised dives under supervision of dive buddy authorized by the DCB. The diver must also demonstrate knowledge of the special problems of deep diving and of special safety requirements.

3.3 Diver Status Maintenance

To maintain certification, a diver will:

(a) Keep a current medical examination.

1) All divers will pass an initial medical examination, and thereafter be examined at specified intervals as stipulated in Section 8.2.
2) After any major illness or injury, as described in Section 8.2(c), a diver will receive clearance to return to diving, from a physician, before resuming dive activities

(b) Log a minimum of 12 dives in a 12-month period, the majority of which must be logged as scientific or working dives (see section 1.1.1). The 12-month period is defined as; the current day's date back 12 months (e.g. October 25, 2017 back to October 26, 2016; April 13, 2017 back to April 14, 2016). Minimum dive and surface interval times will be determined by the Dive Planner chosen for the project.

(c) Log a dive to certification depth during each 6-month period. Divers certified to depths 150 feet and greater may satisfy these requirements with dives to 130 feet or deeper and must be completed in the gear configuration and gasses similar to those the diver utilizes to complete these dives to 150 feet or deeper.

(d) Maintain current First Aid, Adult CPR, Oxygen Provider, and other certifications, as applicable.

3.4 Revocation of Certification

An individual's scientific diver certification can be restricted or revoked for cause by the DCB. Authorizations associated with an individual's Scientific Siver Certification may be restricted or suspended for cause by the DSO. Restrictions or suspensions issued by the DSO may be rescinded by the DSO; these issues will be reported to and reviewed by the DCB, and the outcomes or actions resulting from this review will be documented in the diver's OM record. Violations of regulations set forth in this Manual or other governmental subdivisions not in conflict with this Manual, or demonstration of poor judgement, may be considered cause. The DCB or designee must inform the diver in writing of the reason(s) for revocation. The diver will be given the opportunity to present their case in writing to the DCB for reconsideration. Following revocation, the diver may be reauthorized after complying with conditions the DCB may impose.

All such written statements and requests, as identified in this section, are formal documents, and therefore part of the diver's file.

Certification may be revoked and the diver's status inactivated by the DCB and/or the DSO for:

(a) Failure to comply with any regulation contained herein.
(b) Noncompliance with any pertinent regulations or laws.
(c) Willful disobedience of verbal or written requests by those in charge of diving or vessel operations.

3.5 RE-CERTIFICATION

If a diver's certificate is expired or revoked, they will be re-certified after complying with such conditions as the DSO or DCB may impose. The diver will be given an opportunity to present their case to the DCB before conditions for re-certification are stipulated.

APPENDIX 3.A

DIVER-IN-TRAINING/SCIENTIFIC WATER SKILLS EVALUATION

Applicants for Scientific Diver and Diver-in-Training status must demonstrate proficiency in the following skills during checkout dives and training evaluation dives with the Dive Safety Officer or designee:

_____ Applicant (please print)

_____ Date (month/day/year)

Swim and Skin-Diving Skill Tests

_____ Swim underwater 25 yards (23 m) without surfacing and without swimming aids.
_____ Swim 400 yards (366 m) in 12 minutes or less, without swimming aids, using any stroke/combination of strokes.
_____ Without swimming aids, transport another person of equal size a distance of 25 yards (23 m) in the water.
_____ Tread water for 10 minutes, or the last two without the use of hands, without swimming aids.

Confined Water Evaluation

_____ Enter the water with full equipment.
_____ Clear face mask.
_____ Demonstrate proficiency buddy breathing and the use of an alternate air source with/without a mask.
_____ Demonstrate the ability to alternate snorkel and scuba while swimming.
_____ Demonstrate an understanding of underwater signs and signals.
_____ Demonstrate simulated in-water mouth-to-mouth resuscitation.
_____ Rescue and transport, as a diver, a passive simulated victim of an accident.
_____ Demonstrate the ability to remove and replace equipment while submerged.
_____ Demonstrate a level of comfort in the water acceptable to the instructor.

Open-water Evaluation

_____ Surface dive to a depth of about 10 feet (4.5 m) without scuba.
_____ Demonstrate ability to clear mask and regulator while submerged.
_____ Demonstrate proficiency in air sharing as both donor and receiver.
_____ Enter and leave the surf wearing full scuba equipment.
_____ Leave and board a diving vessel while wearing full scuba equipment.
_____ Snorkel 400 yards (364 m) with breathing apparatus in position, not breathing from the scuba unit.
_____ Compute their own surface gas consumption (SAC) rate in cubic feet/minute for each training dive.
_____ Demonstrate ability to achieve and maintain neutral buoyancy at the surface and below the surface.
_____ Demonstrate techniques of self-rescue and buddy assistance.
_____ Demonstrate ability to make a simulated emergency swimming ascent from a depth of 20 feet.
_____ Navigate underwater.
_____ Demonstrate knowledge and ability to plan and execute a dive.
_____ Demonstrate ability to maneuver efficiently in the environment, at and below the surface.
_____ Show judgment consistent with safe diving practices at all times, both above and below water.

APPENDIX 3.B

WORKING DIVER SWIM EVALUATION

Applicants for Scientific/Working Diver status will demonstrate proficiency in the following skills to the Dive Safety Officer or designee:

_____ Applicant (please print)

_____ Date (month/day/year)

Swimming Skill Tests

_____ Swim 25 yards (23 m) underwater without surfacing and without pushing off from the wall of the pool.

_____ Swim 550 yards (503 m) in 15 minutes or less, without swimming aids, using any stroke/combination of strokes

_____ Swim 200 yards (183 m) using mask, fins, and snorkel.

_____ Without swimming aids, transport another person of equal size a distance of 25 yards (23 m) in the water.

_____ Tread water for 30 minutes without any flotation aids.

Section 4.0

General Operation Procedures

4.0 General Operation Procedures

The following are minimum guidelines and although modifications may be necessary, each will be duly considered in preparation for a dive operation.

4.1 Emergency Aid

(a) TAMU-CC will maintain a list of available sources of emergency aid, equipment, and professional assistance and contact information, e.g. phone numbers and call signs, and instructions for establishing contact with them (Appendix 4.B).
(b) This list will be made available at the University, field offices, and dive locations to fulfill the outlined emergency response plan.
(c) The list will include necessary information to obtain the following types of emergency aid as deemed appropriate for the type of diving activity being conducted:
    1) Recompression Chamber.
    2) Hospital or medical treatment facility.
    3) Air and/or ground transportation.
    4) On-call physician.
    5) Coast Guard and/or National Coordination Rescue Centers.
(d) Two-way communications will be available and accessible at any dive site in order to employ the required emergency services.

4.2 First Aid

Supplies at the dive site will include:

(a) A First Aid kit, in a clearly marked container, and appropriate for the type of operation being conducted (Section 7.2.3(a)).
(b) An Emergency Oxygen supply with an adequate emergency supply and delivery system consisting of a bag-type resuscitator (or equivalent device) (Section 7.2.3(b)).
(c) Automated External Defibrillator (AED)
(d) Backboards, restraint harnesses, and/or cervical immobilization collars are recommended for use in scenarios in which the diver cannot be readily extracted from the water, or as required by the approved dive plan.

4.3 Team Briefing

(a) Prior to any underwater operation, dive team members will be briefed on:
    1) Tasks to be undertaken.
    2) Safety procedures for the diving mode.
    3) Hazards or environmental conditions that may affect safety of the dive operation.
    4) Modifications to operating procedures necessitated by a specific diving operation.
(b) Prior to making individual assignments the Lead Diver or Designated Person in Charge will inquire into the dive team member's current state of physical fitness, and indicate to the dive team member the procedure for reporting physical problems or adverse physiological effects during and after the dive.

4.4 Termination of Dive

The working interval of a dive will be terminated when:

(a) Directed by the Lead Diver or Designated Person in Charge.
(b) A diver requests termination.
(c) A diver fails to respond correctly to communications or signals from a team member.
(d) Communications are lost and cannot be quickly re-established between divers or a diver and the dive location.
(e) A diver begins to use their Reserve Gas Supply (RGS) or the dive-location reserve breathing gas.

4.5 Post Dive Procedures

(a) It is the Lead Diver or Designated Person in Charge's responsibility to:

1) Check the physical condition of all divers.
2) Instruct the diver(s) to report any physical problems or adverse physiological effects including symptoms of decompression sickness.
3) Advise diver(s) of the location of the nearest working decompression chamber.
4) Alert the diver(s) to the potential hazards of flying and increased altitudes in excess of 800 feet after diving, except in an emergency.
5) On working dives, instruct the diver(s) to remain awake and in dive vicinity for at least one hour
6) On working dives, instruct the diver(s) to make reasonable accommodations to remain within two hours travel of a decompression chamber for an additional five hours, after making a dive:
   (i) Outside of the no-decompression limits.
   (ii) Deeper than 100 feet.
   (iii) Using an air-alternative gas as a breathing mixture.

(b) It is the diver's responsibility to:

1) Report any physical problems or adverse physiological effects including symptoms of decompression sickness.
2) Report any equipment malfunctions.
3) Remain awake and in the dive vicinity for at least one hour.
4) On working dives, make reasonable accommodations to remain within two hours travel of a decompression chamber for an additional five hours, after making a dive:
   (i) Outside of the no-decompression limits.
   (ii) Deeper than 100 feet.
   (iii) Using mixed-gas as a breathing mixture.

4.6 HAZARDS TO UNDERWATER OPERATIONS

(a) Notice will be provided for a planned underwater operation, including the start and finish times, to those in the vicinity whose activities may interfere with or pose a hazard to personnel engaged in the operation. These activities include:

1) Vessel movement, vehicular traffic, etc.
2) Overhead crane/gantry operations.
3) Pedestrian traffic.

(b) Diving operations will not take place wherever hazardous activities or conditions in the vicinity pose a safety hazard to the diver(s) or impair support personnel from safely carrying out their work tasks.

4.7 UNDERWATER HAZARDOUS CONDITIONS

As part of the Dive Plan, considerations will include, but not be limited to:

(a) Potential fouling or entrapment of divers.
(b) Differential pressure hazards.
(c) Lockout/Tag-out hazardous energy situations, e.g. propellers, pumps, vessels, or a mechanical apparatus that the inadvertent operation would be hazardous to the diver(s).
(d) Diving in contaminated liquid, either, chemical, microbiological, or thermal.
(e) Limited access or penetration situations when the diver(s) enter a pipe, tunnel, wreck, or similarly enclosed or confining structure.
(f) Marine life.
(g) Currents and/or tidal conditions.

4.8 TEMPORARY IMPAIRMENT OR CONDITION

TAMU-CC will not:

(a) Require a diver to be exposed to hyperbaric conditions against their will, except when necessary to complete decompression or treatment procedures.

(b) Permit a diver to dive or be otherwise exposed to hyperbaric conditions for the duration of any temporary physical impairment or condition that is known and is likely to adversely affect the safety or health of a dive team member. This includes but is not limited to colds, alcoholic intoxication or aftereffects, fatigue, or emotional distress. The diver will be consulted before making such a determination.

4.9 Inspection of Systems, Equipment, and Tools

(a) Before diving or underwater operations commence, personnel will confirm all systems, equipment, and tools to be used are in working order, appropriate for the tasks and in compliance with the Equipment and Systems Section, 7.0.

1) To ensure the highest standard of safety, checklists will be used to confirm that the systems, equipment, and tools are in safe working order.

(b) The breathing gas supply system, reserve breathing gas supplies, masks, helmets, thermal protection, etc., will all be inspected daily and monitored throughout the operations by designated persons to ensure they are functioning properly.

(c) Each person engaged as a diver will perform a complete functional check of their dive equipment in the presence of the Lead Diver or Designated Person in Charge to ensure that the equipment is in proper working order and is suitable for the type of diving operation.

4.10 Water entry and exit

A means capable of supporting the diver (such as an in-water stage or ladder) while entering or exiting the water is required. If it is a fixed structure, such as a ladder, it must extend below the water sufficiently to allow adequate diver access and support (a minimum of one meter is recommended).

4.11 Thermal Exposures

Precautions will be taken to protect divers and topside personnel from adverse thermal exposure and maintain proper thermal balance while engaged in operations.

4.12 Warning Display

When diving from a surface that can support marine traffic, an appropriate warning display will be exhibited near the work site so that it has all-around visibility. This may include, but is not limited to shapes, lights, flags, or placards. See Section 7.2.1 for dive flag specifics.

4.13 Communications

There will be properly functioning two-way audio-communications between the diver(s) and the dive site except as permitted by Section 5.2.2 “SCUBA”, in “Specific Dive Operation Procedures”.

4.14 Decompression Tables

Appropriate no-decompression, repetitive, and decompression tables will be at the dive location.

4.15 Dive Profiles

A depth-time profile, including when appropriate, any breathing gas changes, will be maintained for each diver during the dive, including decompression.

4.16 Hand-held Power Tools and Equipment

Hand-held electrical tools and equipment will:

(a) Be off and de-energized before being placed into or retrieved from the water.

(b) Not be turned on until requested by the diver.

4.17 Emergencies and Deviations from Regulations

In an emergency requiring the saving of personnel, TAMU-CC divers may act in variance with the operating procedures and recommendations established in this standard. A written report of such actions will be submitted to the DCB explaining the circumstances and justifications.

4.18 Flying and Increased Altitudes after Diving

(a) The diver(s) will be made aware of the potential hazards of flying and increased altitudes in excess of 1000 feet after diving, except in an emergency and should follow the appropriate guideline for preflight surface intervals unless the decompression procedure used has accounted for the increase in elevation.

(b) It is advised that the diver(s) adhere to the "flying after diving recommendations" of the system being used or provide a minimum surface interval of 12 hours for single no-decompression dives; 18 hours following multiple days of diving, and; a minimum of 24 hours when dives required decompression before ascending to altitudes in excess of 1000 feet.

4.19 RESERVE GAS SUPPLY

A diver-carried Reserve Gas Supply (RGS) consisting of an independent reserve cylinder with a separate regulator must be worn by each diver:

(a) As specifically directed in Section 4.0 and 5.0, General and Specific Dive Procedures.
(b) When diving outside the no-decompression limits.
(c) In overhead environments where direct ascent to the surface is prevented.
(d) In enclosed or physically confined spaces.
(e) In low visibility where the diver cannot read their gauges.
(f) Deeper than 130 feet.
(g) When deemed appropriate by the DSO.

The diver's RGS must comply with the following minimum standards:

(a) Be of sufficient duration for use until the diver can reach;
    1) The surface from the maximum depth of the dive,
    2) Another source of breathing media, or
    3) A Standby Diver equipped with another source of breathing media.
(b) The cylinder valve must not be blocked and be easily accessible.
(c) The high-pressure hose must be of sufficient length to allow the diver to easily read the HP gauge.
(d) The second-stage gas hose must be of sufficient length to easily reach the mouth and to allow for head movement (rotation) from shoulder to shoulder.
(e) If a longer hose is used for the second stage, it must be either be:
    1) Stored where it can be accessed easily, or
    2) Fastened with a proven quick release mechanism (octo-holder, necklace, etc.).
(f) If Buoyancy Compensator Device (BCD) cam-bands are used for securing the diver's RGS, mounting must not interfere with the intended purpose of the cam-bands.
(g) Be kept closed until needed, to prevent accidental loss of breathing media.
(h) The diver's RGS valve must be uniquely identified and configured so it is easily distinguished, visually and/or tactually, from the primary gas cylinder's yoke and/or valve knob.
(i) Contain an appropriate breathing gas mixture to accommodate the mode of diving and depth requirements of the dive operation.
(j) In all cases, when RGS is activated, the dive will be aborted. The reason for activation will be ascertained and corrected prior to continued use of the involved equipment.

4.20 QUALIFICATIONS OF DIVE TEAM

(a) Each dive team member will have the experience or training necessary to perform task assignments in a safe and healthful manner.

4.20.1 General Requirements

Each dive team member will have experience or training in:

(a) The use of tools and systems relevant to task assignments.
(b) The techniques of the assigned diving mode.
(c) The dive operations and emergency procedures.
(d) First aid, CPR, and the administration of oxygen in a dive related emergency.
(e) Physics and physiology if exposed to or controlling the exposure of others to hyperbaric conditions.

4.20.2 General Responsibilities

(a) Refusal to dive:

(1) The final decision to dive is the diver's. A diver may refuse to dive, without fear of reprisal, if they feel it is unsafe for them to dive.

(2) Safety - ultimate responsibility for safety rests with the individual diver. It is the diver's responsibility and duty to refuse to dive if, in their judgment, conditions are unsafe or unfavorable, or if they will be violating the precepts of their training or the regulations of this standard.

(b) Termination of the dive:

(1) It is the responsibility of the diver to terminate the dive, without fear or penalty, whenever they feel it is unsafe to continue the dive, unless it compromises the safety of another diver already in the water.

(2) The dive will be terminated with sufficient gas allowing the diver to safely surface, or to reach an additional gas source at the decompression station.

4.20.3 Dive Team Assignments

Each dive team member will be given task assignments in accordance with their experience or training. Limited additional tasks may be assigned to an employee undergoing training provided these tasks are performed under the direct supervision of an experienced dive team member.

NOTE: The Lead Diver or DPIC may switch task assignments between dive team members on a dive operation as needed, provided they have the training and experience to assume the new role, and another person with equivalent experience and training takes their place.

(a) Lead Diver/Designated Person in Charge (DPIC)

Lead Divers oversee all aspects of Scientific Dives, the DPIC oversees all aspects of Working Dives. The Lead Diver/DPIC is in charge of the planning and execution of the dive operation, including the responsibility for the safety and health of the dive team. In carrying out these responsibilities, duties will include, but not be limited to:

(1) Being fully cognizant of all relevant governmental regulatory agency and member association regulations that apply to the dive operation and dive mode employed.

(2) Ensure all the rules and regulations outlined in TAMU-CC Diving Standards for Underwater Operations are followed.

(3) Coordination with other known activities in the vicinity that are likely to interfere with dive operations.

(4) While on duty be in immediate control and available to implement emergency procedures.

(5) Ensuring all dive team members possess current certifications and are qualified for the type of diving operation.

(6) Ensure dive operations are carried out from a safe and suitable location on the surface.

(7) Develop, modify, and produce pre and post-dive checklists for dive operations.

(8) Develop and implement emergency/contingency procedures.

(9) Be aware of the procedures to obtain medical support in the event of an accident, diving and non-diving. Ensure two-way communications are available at dive location to obtain emergency assistance.

(10) Oversees adherence to the dive plan for each dive operation undertaken.

(11) Ensures sufficient breathing mixtures, supplies, and proper equipment is available for safe and timely completion of job tasks, as per the dive plan.

(12) Assign duties to members of the dive team and personally direct them throughout dive operations.
(13) Personally verify all dive team members are qualified and physically able to perform tasks assigned. The Lead Diver/DPIC will assess the physical condition of the divers prior to each dive to determine if any physical impairment is present which would be detrimental to their health and safety under hyperbaric conditions.
(14) Ensure diving and safety equipment designated for use is:
    (i) Suitable for the planned operation.
    (ii) Sufficient for the requirements of the diving mode used.
    (iii) Inspected prior to each dive and is in good working order.
(15) Ensure all relevant operating instructions, manuals, decompression tables, and regulatory publications are available at the dive location and are maintained to reflect current changes and/or developments.
(16) Ensure detailed briefing of dive team and support personnel including:
    (i) Tasks to be undertaken
    (ii) Possible hazards and conditions
    (iii) Modifications to diving or emergency procedures necessitated by the specific dive operation.
    (iv) Suspension of dive operation if conditions are not safe.
(17) Make modifications to standards or safety procedures as necessitated by specific dive operations.
(18) Maintain an Operational Dive Log (Section 6.1.1 and Appendix 6.A) at the dive location for each diver during the dive, or ensure a topside personnel is maintaining the Operational Dive Log.
(19) Ensure divers are properly tended while in the water when necessary.
(20) Ensure the dive is terminated when:
    (i) Diver requests termination.
    (ii) Diver fails to respond or communication is lost between the diver and dive team members at the dive site.
    (iii) Diver begins to use their reserve breathing gas supply.
    (iv) Weather or site conditions are degraded to the extent that diver's safety may be compromised.
(21) Ensure after every dive:
    (i) The physical condition and well-being of the diver is checked by visual observation and verbal questioning.
    (ii) The diver is instructed to report any problems or symptoms of pressure related injuries.
    (iii) The diver is advised of the location of the nearest operating decompression chamber.
    (iv) The diver is acquainted with the potential hazards of flying after diving or traveling to altitudes in excess of 800ft, except in the case of an emergency.
    (v) Operational dive log information is recorded (Section 6.1.2 and Appendix 6.B).
(22) On working dives, ensure after any treatment or dive the diver is instructed to remain awake and in the dive vicinity for at least one hour.
(23) On working dives, instructing the diver(s) to make reasonable accommodations to remain within two hours travel of a decompression chamber for an additional five hours, after making a dive:
    (i) Outside the no-decompression limits.
    (ii) Deeper than 100 feet.
    (iii) Using mixed-gas as a breathing mixture.

(24) Reporting to the DSO and DCB any physical problems or adverse physiological effects including symptoms of pressure-related injuries, accidents, and incidents, involving TAMU-CC personnel.

(25) Maintain and submit reports required by TAMU-CC to the DSO and DCB for forwarding to appropriate governmental agencies and member organizations.

(26) The Lead Diver/DPIC can serve as topside, a diver, or any other dive team assignment as long as they ensure the above items are carried out as appropriate, ensure that all divers are trained in their respective assignments, and directly supervise any diver that is training to serve in a Lead Diver/DPIC role.

(b) Diver:

The Diver is assigned by the Lead Diver/DPIC to perform specific tasks in the water and topside. Divers will be at least 18 years of age, medically certified fit to dive, have knowledge of diving theory and practice, a full understanding of the equipment in use, and the tasks assigned. Each Diver will:

(1) Accomplish all tasks assigned by the Lead Diver/DPIC.
(2) In the event a Diver is assigned a task which they do not consider themselves competent by training and/or experience, the diver will immediately inform either the Lead Diver/DPIC.
(3) Read, understand, and comply with all TAMU-CC policies and applicable governmental regulations as they relate to their qualifications or performance while engaging in dive operations.
(4) Maintain a level of fitness appropriate for the tasks to be encountered.
(5) Will immediately return to the surface when instructed to do so by the Lead Diver/DPIC.
(6) Ensure deepest depth attained is noted before ascent (i.e. SCUBA).
(7) Act as a Standby Diver when directed to so and will:
    (i) Be dressed sufficiently to allow near immediate entry into the water and to stay at depth, as long a circumstance require.
    (ii) Remain at their station throughout the entire dive.
    (iii) Remain abreast of events of the dive.
    (iv) Not be assigned any tasks that may interfere with their duties as a Standby Diver while a diver is in the water.
(8) Comply with regulations or instructions concerning the use, maintenance, repair, and testing of all diving equipment provided for the operation.
(9) Report any recent medical treatment or illness so that a proper determination can be made concerning their fitness and/or ability to dive.
(10) Immediately report all symptoms or suspected symptoms of diving related injuries to the Lead Diver/DPIC as early and accurately as possible.
(11) Report to the Lead Diver/DPIC any defect or malfunction of the diving equipment provided for the dive operation.
(12) Follow safe dive practices at all times, during the dive operation whether on deck or in the water. Bring to the attention of the Lead Diver/DPIC any questionable items. Be alert for the safety of others as well as themselves.
(13) Assist in the proper training of new personnel.
(14) On working dives, make reasonable accommodations to remain within two hours travel of a decompression chamber for an additional five hours, after dives:
    (i) Outside the no-decompression limits.
    (ii) Deeper than 100 feet.
    (iii) Using mixed-gas as a breathing mixture.
(15) Know and observe the rules for flying after diving or increased altitudes in excess of 800 feet, except in the case of an emergency.
(16) Ensure that their diving equipment has been maintained, prepared, and tested before each dive.
(17) Maintain a logbook of all TAMU-CC related dives.

(c) Tender

The Tender will be assigned by the Lead Diver/DPIC to tend the diver(s). The tender will devote their full time and attention to tending the diver(s) they are assigned to from the preparation of the dive until its completion.

The Tender will:

(1) Assist the diver(s) in dressing and undressing.
(2) Confirm that the diver's equipment is functioning properly and inform the Lead Diver/DPIC when a diver is ready.
(3) Tend the diver umbilical's staying aware of the diver's depths and location at all times.
(4) Set up and operate the equipment as directed by the Lead Diver/DPIC.
(5) In the event they are assigned a task they do not consider themselves qualified to undertake, by either training and/or experience, they will immediately inform the Lead Diver/DPIC.
(6) Assist in topside work as required or directed, providing tending duties are not affected.
(7) Be alert for and immediately report conditions that may be hazardous or unsafe.

(d) Standby Diver

A Standby Diver (also referred to as Safety Divers) is an individual possessing the training and experience to enter the water to render prompt and immediate assistance to a stricken diver.

Standby Diver(s) are required on dives:

(1) Conducted 100 feet and deeper.
(2) Outside the no-decompression limits.
(3) Conducted in overhead environments where direct ascent to the surface is limited (e.g., ice, caves, or wreck penetrations).
(4) When a diver is tethered.
(5) Deemed appropriate by the DSO.

Standby Diver(s) will:

(1) Be capable and qualified to carry out all of the duties and responsibilities of the diver.
(2) Perform a surface check of all equipment prior to commencement of the dive and maintain its function until the completion of the dive.
(3) Remain in the immediate vicinity of the dive site; be suitably prepared, and ready to enter the water when directed by the Lead Diver/DPIC.

4.21 PERSONNEL REQUIREMENTS

The number of diving personnel required for a dive operation is never less than three (3), with the exception that two (2) personnel can be present, a Lead Diver or DPIC, and a diver, IF the dive operation is conducted in a confined water environment in the presence of a DCB/DSO approved active Waterskills Instructor (WSI). However, planning will take into consideration not only the direct requirements of the work to be performed, but also additional factors either known or suspected that may lead to complications during the conduct of the intended operation. Merely because a dive operation comprised of three persons may be adequate during one operation does not guarantee the same number will be sufficient to accommodate the requirements of another.

4.22 DIVE PLAN

Before conducting any dive operations under the auspice of TAMU-CC, a job assessment will be formulated in the form of a Dive Plan (Appendix 4.A).
NOTE: When preparing a Dive Plan, it is preferred Appendix 4.A be copied and used as is, but may be modified to suit the individual operational requirements.
The primary purpose of the Dive Plan is to provide a dive plan in the form of a written document.

(a) Each Dive Plan will:
  (1) Be submitted to the DSO or DCB for review and approval.
  (2) Be reviewed and updated as warranted, i.e. staff safety concerns are conveyed, new equipment, procedures, or an injury/accident has occurred.
  (3) Have an approved copy at the dive location.

(b) Each Dive Plan will consist of:
  (1) Project Information that will include, when applicable:
    (i) Project.
    (ii) Dive type.
    (iii) Objective.
    (iv) Proposed dive site(s) and alternatives.
    (v) Proposed work and dive mode.
    (vi) Immediate contact name and number(s).
  (2) Diving Participants including:
    (i) Diver's name.
    (ii) Qualifications.
    (iii) Certificate or certification held.
  (3) Site Plan and Orientation specifying:
    (i) Dive location(s).
    (ii) Directions.
  (2) Dive Site description providing:
    (i) Conditions.
    (ii) Hazards (above and below water).
    (iii) Estimated depth(s).
    (iv) Topography.
    (v) Visibility.
    (vi) Surf.
    (vii) Boat traffic.
    (viii) Tides.
    (ix) Currents.
    (x) Bottom type/composition.
    (xi) Marine inhabitants.
  (3) Dive Plan outlining:
    (i) Number of proposed dives.
    (ii) Maximum depth.
    (iii) Bottom time(s).
    (iv) Diving equipment and systems, including thermal protection.
    (v) Breathing gas mixtures and supplies (including reserves).
    (vi) Repetitive dive plans.
    (vii) Decompression status and treatment procedures.
    (viii) Dive boundaries and areas of avoidance.
    (ix) Descent and ascent procedures.
    (x) Signal displays.
    (xi) Surface support and standby diver procedures.
    (xii) Boats to be employed.
    (xiii) Entry/exit procedures.
    (xiv) Buddy checks and procedures.
    (xv) Communications.
    (xvi) Emergency and diver recall procedures (in-water).
  (4) Proposed Sequence of Procedures will include:
    (i) Job steps.

(ii) Listings of potential hazards to the diver(s) such as fouling, entrapment, marine animals, and limited access or penetration situations.
(iii) Recommended safe procedures and protections.

(5) Dive operation personnel assignments and responsibilities that take into consideration the fitness and training of each team member so all dives are planned around the competency of the least experienced diver. An Dive Assistance Plan Emergency (Appendix 4.B) will be submitted with each dive plan and include:

(i) General emergency procedures
(ii) Primary emergency contact numbers
(iii) Diver Alert Network phone numbers
(iv) TAMU-CC DSO contact information
(v) TAMU-CC secondary emergency contact information

(6) Emergency Contact Sheet (Appendix 4.C) with the following contact information:

(i) Name, contact information, and relationship of person to be contacted for each diver in the event of an emergency.
(ii) Emergency contact information.

(7) Planned available means of transportation.

4.23 Decompression Management

(a) On any given dive, both divers in the buddy pair must follow the most conservative dive profile.
(b) A safety stop performed during the ascent phase of the dive should be conducted on any dive that exceeds 30fsw (9.14m).

APPENDIX 4.A

TAMU-CC DIVE PLAN

Date Submitted		**Date Approved**	
Submitted By		**Approved By**	

General Dive Operations

Proposed Date(s) of Dive Operations		through			
Location of Dive Operations		Distance from Shore			
Dive Platform		Number of Divers			
Number of Dive Rotations/Day		Number of Dives/Day		Number of Consecutive Dive Days	
Depth Range		Average Dive Time (min)			

Dive Mode		Dive Purpose		Dive Planner	
SCUBA		Scientific		Type	
Surf. Supply		Working		Model	
Rebreather		Prof/Training			

Diving Gas						Job Status		
		Air						
		Nitrox		(% O2)				On-Duty
		Trimix		(% O2)	(% He)			Off-Duty w/Univ. Equip.

Environment

	Salt Water		Structure		Trimix		Search/Recovery		Full Face Mask
	Fresh Water		Tropical		Oil/Gas Rig		Rescue		Hard Hat
	Open Water		Temperate		Artificial Reef		Dive Accident Mgmt.		Comms.
	Confined Water		Cold		Night		Decompression		
	Shore		Ice		Research		Blue Water		Other
	Boat		Cave/rn		Collecting		Surface-supply		
	Platform		Wreck		Photography		Hookah		
	Bottom Orient.		Computer		Navigation		Rebreather		Other
	Water Column		Nitrox		Altitude		Dry Suit		

Possible Hazards

Certain hazards are present on all dives (AGE, DCS). List hazards unique to this operation

Physical		Biological		Manmade	
	Current		Sharks		Boat Traffic
	Fog		Spiny Organisms		Overhead Cranes
	Ice		Marine Mammals		Gantry
	Low Visibility		Stinging Organisms		Construction
	Pollution		Other:		Other:
	Other:		Other:		Other:

Additional Comments:

Tools/Equipment

	Air Compressor: University property?						
	If no, list owner.			Cylinder Specifics			
	Cylinders: University property?			Number		Size	Type
	If no, list owner.						
	Cylinder Filling/Gas Mixing: University based?						
	If no, list owner.						
	Air Tools: (lift bags, vacuum, drills, etc.) will be used for this project.						
	O2 Kit at Site		AED at Site		First Aid Kit at Site		Dive Flag at Site
	Diver Recall Device	Type?					

Diving Equipment Request:

Personnel

Supervisors

Name	Institution/Agency	Phone	Assignments	Depth Rating
			Chief Scientist	
			Principle Investigator	
			Project Dive Supervisor	

Divers *

Name	Institution/Agency	Phone	Assignments	Depth Rating

Non-Divers

Name	Institution/Agency	Phone	Assignments	Depth Rating

** NOTE: Visiting divers are also required to produce an AAUS Reciprocity Form from their home Agency/Institution's DSO or have TAMUCC DCB approval required.*

Proposed Work

Briefly provide details of dive procedures to clarify the items noted above.

Safety Precautions

___ Emergency Assistance Plan (4.B) Appended Prepared By: _____

___ Emergency Contact Information (4.C) Appended Date: _____

APPENDIX 4.B

DIVE EMERGENCY ASSISTANCE PLAN

Instructions

Complete a Diving Emergency Assistance Plan (DEAP) for each unique diving location and submit the plan to the TAMUCC DSO or designee with the dive plan of each project or anytime any information on the EAP changes.

General Procedures

A. Make appropriate contact with the victim or rescue as required.

B. Evaluate and establish the victim's **C**irculation, **A**irway, and **B**reathing (CAB).

a. If victim has no pulse and is not breathing, begin cardiopulmonary resuscitation (CPR) using AED and oronasal resuscitation mask or bag valve mask, supplemented with oxygen.

b. If victim is breathing, but unconscious, place in the recovery position and administer oxygen via a non-rebreather type mask.

c. If victim is awake and alert, place in a position of comfort and administer 100% oxygen via a demand oxygen resuscitator or non-rebreather type mask. If the victim is not nauseated, give clear non-alcoholic/non-caffeinated fluids to drink.

F. If the victim's condition is life threatening or urgent, call the local Emergency Medical System (EMS) or U.S. Coast Guard (USCG) for transportation to the nearest medical treatment facility.

G. If the victim's condition is not urgent, contact the Diver's Alert Network (DAN) for guidance.

H. Use the Accident Management Guides (located in the lid of the 02 kit) to document a neurological exam and dive history information.

I. Gather additional information about the incident and prepare victim for transport.

J. Secure diver's equipment for inspection. **DO NOT DISASSEMBLE EQUIPMENT OR EXHAUST GAS FROM THE SYSTEM**. Close the cylinder valve ONLY. Count and record the number of turns required to secure valve. Dive computer may go with diver and EMS.

K. Call and speak to the TAMUCC DSO and the Secondary TAMUCC Emergency Contact person to report the incident. Continue calling until positive contact is made. Speak to a person, do not just leave a message.

L. Complete and submit Incident and Accident Report Form (Appendix 10.A) to TAMUCC DSO for DCB review.

Primary Emergency Contacts

Shore Base Emergency Transportation
Emergency Medical Service (EMS)
911

At Sea Vessel Emergency Transportation
United States Coast Guard (USCG)
Channel 16 on Marine VHF Radio

Divers Alert Network (DAN)
+1-800-446-2671
+1-919-684-9111

TAMUCC Dive Safety Officer
Larry Lloyd
Office:
Cell:
Email: dive@tamucc.edu

Secondary TAMUCC Emergency Contact

Emergency Contact Information

Dock/Marina:
Address: Phone Number:
Directions:

Hospital Emergency Room:
Address: Phone Number:
Directions:

Hyperbaric Chamber:
Address: Phone Number:
Directions:

Airport:
Address: Phone Number:
Directions:

USCG, Rescue Coordination Center (RCC):
Facility Name: RCC New Orleans Phone Number: 504-589-6225

Additional Available Means of Transportation:

Other emergency phone numbers, radio frequencies, and contacts:

APPENDIX 4.C

DIVE TEAM EMERGENCY CONTACT INFORMATION

Emergency Contact Information for Team Members

Diver: _____
Emergency Contact: _____ Relation: _____
Primary Contact Number: _____ Secondary Contact Number _____

Diver: _____
Emergency Contact: _____ Relation: _____
Primary Contact Number: _____ Secondary Contact Number _____

Diver: _____
Emergency Contact: _____ Relation: _____
Primary Contact Number: _____ Secondary Contact Number: _____

Diver: _____
Emergency Contact: _____ Relation: _____
Primary Contact Number: _____ Secondary Contact Number _____

Diver: _____
Emergency Contact: _____ Relation: _____
Primary Contact Number: _____ Secondary Contact Number _____

Diver: _____
Emergency Contact: _____ Relation: _____
Primary Contact Number: _____ Secondary Contact Number _____

Diver: _____
Emergency Contact: _____ Relation: _____
Primary Contact Number: _____ Secondary Contact Number _____

Diver: _____
Emergency Contact: _____ Relation: _____
Primary Contact Number: _____ Secondary Contact Number _____

Diver: _____
Emergency Contact: _____ Relation: _____
Primary Contact Number: _____ Secondary Contact Number _____

Diver: _____
Emergency Contact: _____ Relation: _____
Primary Contact Number: _____ Secondary Contact Number _____

Section 5.0

Specific Dive Operation Procedures

5.0 SPECIFIC DIVE OPERATION PROCEDURES

Specific Dive Operation procedures will vary with the dive mode. Prior to mobilization, the completed Dive Plan (Section 4.23) will have determined the dive mode, equipment needs, and staffing requirements. For all dive modes, dives deemed "training" dives in confined water may use 2 personnel, a lead diver and a diver, when a DCB/DSO approved Waterskills Instructor (WSI) is present.
NOTE: Solo diving is prohibited and all diving must assure adherence to the buddy system.

5.1 BREATH-HOLD DIVING

Breath-hold diving is prohibited unless specifically approved by the DSO and/or DCB. Any personnel wishing to engage in breath-hold diving as part of their job functions must request approval to the DSO after which the DSO will review the proposed activities. Training and operational requirements may be implemented to receive breath-hold diving approval including personnel and equipment requirements.

5.2 SCUBA DIVING

TAMU-CC dive operations employing SCUBA Diving will comply with the following requirements.

5.2.1 Defined

SCUBA is defined as a diving mode in which the diver's gas supply is independent of surface support.

5.2.2 Limitations

(a) The following are minimum requirements for TAMU-CC SCUBA Diving Operations:

(1) A diver will be accompanied by another diver (buddy) in the water in continuous contact (visual or physically) or tethered from the surface, during the dive operation. Buddy system defined:

(i) A single buddy team can consist of two or three divers. A four diver deployment will represent two buddy teams of two.

(ii) A single diver and tender will comprise a buddy team of two. Additional requirements of "working" divers are defined and outlined in Sections 1.1.1 and 3.1.3.

(iii) The buddy system is based upon mutual assistance, especially in an emergency. Dives will be planned around the competency of the least experienced diver and the dive terminated as soon as a team member runs low on breathing gas, normally defined as 500 psi.

(2) Standby Diver(s) availability will be based on requirements outlined in Section 4.20.3 (e) and 5.2.3 (b).

(3) Audio communications are not required for a diver who is accompanied by another diver or who can communicate with the tender on the surface through line-pull signals.

(4) Planned bottom time will not exceed the:

(i) No-decompression limits appropriate for the gas mixture being used unless pre-approved by the DCB.

(ii) Gas supply duration of the cylinder(s). Duration will be based on pressure(s) determined before the dive and exclusive of the reserve breathing gas supply.

(5) Breathing gas(s) supplied to the diver(s) will be appropriate for the planned depth of the dive. In general, a diver's Maximum Operating Depth (MOD) will be determined by a working PPO2 of ≤1.4, a resting PPO2 of ≤1.6, and an Equivalent Air Depth/Equivalent Narcosis Depth (EAD/END) of ≤130 feet.

(6) Each diver will be equipped with a timing device and depth indicator.

(7) Amount of weight and system used will be appropriate for the suit and depth of the dive.

(8) A cylinder harness with a quick release will be worn to secure the breathing gas to the diver.
(9) A personal floatation device will be worn at all times.
(10) Each diver will be capable of achieving and maintaining positive buoyancy.

(b) The following are additional minimum requirements for TAMU-CC SCUBA Diving Operations for dives deemed "working" (Section 1.1.1). Working dives will not be conducted:

(1) To depths deeper than 130 feet.
(2) To depths deeper than 100 feet or outside the no-decompression limits unless a decompression chamber is ready for use.
(3) Against currents exceeding (1) knot unless diver is tethered.
(4) In enclosed or physically confining spaces unless diver is tethered and a diver is stationed at the underwater point of entry.
(5) Without the use of an RGS by each diver (see 4.19 and 7.1.11 for RGS specifics).

NOTE: The valve of the reserve breathing gas will be kept closed until needed preventing accidental loss of breathing gas.

(6) Working dives will not be made with any gas mixture other than "air", unless a decompression chamber is ready for use at the dive location.

5.2.3 Personnel Requirements

The following are minimum personnel requirements for SCUBA diving operations. Task assignments will comply with Section 4.20.3.

NOTE: The Lead Diver or DPIC may switch task assignments between dive team members on a dive operation as needed, provided they have the training and experience to assume the new role, and another person with equivalent experience and training takes their place.

Dives deemed "Scientific" (Section 1.1.1)

(a) Depths less than 100 ft.

(1) Minimum number of dive team members for scuba is three (3).
(2) Required dive team task assignments; 1 Lead Diver, 2 Divers (note: a single diver may be tended to a standby diver as per section 4.20.3.

(b) Depths 100 ft. and greater.

(1) Minimum number of dive team members for scuba is five (5).
(2) Required dive team task assignments; 1 Lead Diver, 2 Standby Divers, and 2 Divers.

Dives deemed "Working" (Section 1.1.1)

(a) All scuba dives regardless of depth.

(1) Minimum number of dive team members for scuba is three (3).
(2) Required dive team task assignments; 1 DPIC, 1 Tender[1], 1 Standby Diver[1, 2], and 1 Diver.

NOTES:
[1] The Lead Diver or DPIC may be assigned and assume this task provided they are trained and qualified.
[2] A single Standby Diver must be tethered. If not tethered, two Standby divers are required increasing the dive team total by one.

5.2.4 Minimum Equipment

The minimum equipment required for SCUBA is:

(a) Harness/Backpack.
(b) Gas Cylinder and Valve.

(c) Regulator First Stage.
(d) Primary Second Stage.
(e) Back-up Second Stage.
(f) Buoyancy Compensator.
(g) Mask.
(h) Fins.
(i) Weight system.
(j) Timing devices (Diver's and Lead/DPIC).
(k) Depth Gauge.
(l) Pressure Gauge.
(m) Dive tables and bottom timer or computer.
(n) Thermal Protection.
(o) Diving Ladder or other safe means of exiting the water.
(p) First Aid kit.
(q) Emergency Oxygen Supply.
(r) Field Dive Log Sheets.
(s) Written Dive Plan applicable to the job to be conducted.
(t) TAMU-CC Diving Standards for Underwater Operations (working dives only).

5.2.5 Pre-dive Checklist

The following are minimal guidelines that may require modification for each diving mode engaged in:

(a) Equipment Preparation
  (1) Assemble, layout, and inspect diving equipment intended for the job. Check for proper function, sizing, and signs of wear; replace and repair all as necessary.

(b) General Equipment
  (1) Check accessory equipment – tools, lights, special systems, spares, etc. – all on site and in working order.
  (2) Check diver entry and exit points.

(c) Prepare Gas Supplies
  (1) Check that breathing gas supplies are available in sufficient volumes to accommodate the diving mode, depth, and planned profiles, including emergency decompression.
  (2) Check Emergency Oxygen Supplies are of sufficient quantity to supply divers for the time required to transport them to a medical care facility, or 12 hours, whichever is less.
  (3) Ensure gas supply is sufficient in volume for accessory equipment throughout all phases of the operation.

(d) Activate and Test the Breathing Gas Supply
  (1) Breathing Gas Hoses:
    (i) Check for cracks and punctures.
    (ii) Check connections at the first and second stage are secure.
  (2) Cylinders
    (i) Visually inspect cylinder for pitting, cracks, dents, or any evidence of weakness.
    (ii) Remove cylinder valve cover and inspect O-ring; replace as necessary.
    (iii) Check manifolds and valves.
    (iv) Gauge cylinder pressure.
  (3) Regulator
    (i) Attach regulator to cylinder. Slowly open cylinder valve.
    (ii) Check for leaks.

(iii) Check delivery - ensure breathing gas supply pressure is adequate to supply second stage.
(iv) Close valve and if applicable close reserve mechanism (lever in up position).

(e) Final Preparations
(1) Verify all necessary records, logs, and timesheets are at dive station.
(2) Check that all appropriate decompression and treatment tables and protocols are in hand.

(f) Environmental Conditions
(g) Evaluate if environmental conditions are safe to dive prior to entering the water.

5.2.6 SCUBA Dive Operation Checklist

(a) Dive Briefing
(1) Dive Objective(s).
(2) Time & Depth.
(3) Task &Team Assignments.
(4) Tools & Techniques.
(5) Hazards & Conditions.
(6) Emergency Procedures (aborted dive, diver recall, injured diver).
(7) Turn around pressure and required surfacing pressure
(8) Entry, exit, descent, and ascent procedures

(b) Scuba Pre-dive Inspection
(1) Check Divers (mental and physically prepared).
(2) Check Equipment (Mask, Fins, Gloves, Hood, etc.).
(3) Check Cylinder Valve(s) (fully open).
(4) Check Gas Supply (via gauge & second stage).
(5) Check Buckles (reach & rigging for quick release).
(6) Check Weights.
(7) Check Hoses (proper routing).
(8) Check Buoyancy Compensator (for function).
(9) Check Regulator Second Stages (for function).
(10) Review Dive Plan (questions).
(11) OK Diver(s) to enter water.
(12) Start Decent MARK TIME.

(c) Post Dive Procedures
(1) Debrief each diver.
(2) Check each diver's physical condition.
(3) Record Dive (on permanent record).

5.2.7 Other Requirements

If application of specific regulations is not clear, compliance will be based on one or both of the following:

(a) The regulations that promote the greater safety of divers.
(b) The DSO's decision as to safety and need.

5.3 HOOKAH DIVING

TAMU-CC dive operations employing Hookah will comply with the following requirements.

5.3.1 Defined

Hookah is a dive mode in which a diver is supplied compressed breathing gas from the surface via a gas line. Voice communications, strength members, and pneumofathometers are not required. The hookah diver is responsible for monitoring their own depth, time, and diving profile.
NOTE: Hookah can only be employed on dives deemed "Scientific". Dives deemed "Working" will not employ the use of Hookah.

5.3.2 Limitations

(a) The following are minimum requirements for TAMU-CC Hookah Diving Operations:

(1) Hookah dives will not be permitted deeper than 20 feet.
(2) A safety harness/belt will be worn to aid retrieval of the diver and for attachment of RGS and diver's gas line.
(3) Harness/belt fastening systems will be designed to prevent accidental disengagement.
(4) To prevent strain from being placed on the diver's second stage regulator, the gas line will be attached to the lift ring on the diver's harness/belt.
(5) A weight belt appropriate for the dress and depth of the dive will be worn. Integrated weights may be incorporated into harnesses and belts providing the weight can be ditched without interrupting the diver's gas supply.
(6) An RGS shall be configured and worn per the criteria outlined under Sections 4.19 and 7.1.11.
(7) A Standby Diver will be available at the dive location while a diver is in the water (Section 4.20.3 (e)).
(8) Hookah divers will be continuously tended by a dive team member while in the water.
(9) Line-pull signals are the primary means of communication; therefore divers and tenders will know and implement line-pull signals accordingly.
(10) Each dive operation will have a primary breathing gas supply sufficient to support divers for the duration of the planned dive.
(11) A diver will be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces.

5.3.3 Personnel Requirements

The following are minimum personnel requirements for Hookah dive operations. Task assignments will comply with Section 4.20.3.

NOTE: The Lead Diver may switch task assignments between dive team members on a dive operation as needed, provided they have the training and experience to assume the new role, and another person with equivalent experience and training takes their place.

Dives deemed "Scientific" (Section 1.1.1)

(a) All hookah dives regardless of depth.

(1) Minimum number of dive team members required for hookah is three (3).
(2) Required dive team task assignments; 1 Lead Diver, 1 Tender[1], 1 Standby Diver[1,2], and 1 Diver.

NOTES:

[1] The Lead Diver may be assigned and assume this task provided they are trained and qualified.

[2] A single Standby Diver must be diving in the SCUBA mode to increase effectiveness of rescue operations.

5.3.4 Minimum Equipment

The minimum equipment required for Hookah diving:

(a) Adequate gas source with appropriate volume to support diver(s).
(b) Gas supplies that comply with equipment regulations as outlined in Section 7.0 (specifically 7.1.1 (cylinders), 7.5 (Compressors), and 7.6 (Gas Quality Standards)).

(c) A gas supply hose must be rated for a minimum operating pressure of 130 psi and be appropriate length to support dive operation.
(d) Decompression and treatment tables.
(e) Diving Ladder or other safe means of exiting diver from the water.
(f) Diver's personal diving equipment consisting of:
  (1) A Mask.
  (2) A means of determining depth, time, and dive profile.
  (3) Harness/belt.
  (4) RGS (if applicable, see 4.19 and 7.1.11 for specifics on RGS)
  (5) Weight belt if appropriate.
  (6) Protective clothing/thermal protection.
  (7) Tools as required.
(g) First Aid kit.
(h) Emergency Oxygen Supply.
(i) Field Dive Log Sheets.
(j) Written Dive Plan applicable to the job to be conducted.

5.3.5 Pre-dive Checklist

(a) Equipment Preparation
  (1) Assemble, layout, and inspect all diving equipment and spares intended for the job. Check for wear; replace and repair as necessary.
(b) General Equipment
  (1) Check accessory equipment – tools, lights, special systems, spares, etc. – are on site and in working order.
  (2) Check diver entry/exit ladder.
(c) Preparing Gas Supplies
  (1) Check that breathing gas supplies comply with regulations for purity, and are properly mixed/filled to accommodate the dive mode and profile, including emergency decompression.
  (2) Check that gas supply is sufficient in volume to accommodate the diving mode, depth, and planned profiles, emergency decompression, and any accessory equipment.
  (3) Verify gas hose(s) running from the cylinder do not pass near high-heat areas, are free of kinks and bends, and are not exposed in such a way that they can be severed, or damaged by machinery or other means.
  (4) Check Emergency Oxygen Supplies are of sufficient quantity to supply divers for the time required to transport them to a medical care facility, or 12 hours, whichever is less.
  (5) Cylinders
    (i) Visually inspect cylinders for pitting, cracks, dents, or any evidence of weakness.
    (ii) Remove cylinder valve cover and inspect O-ring; replace as necessary.
    (iii) Check manifolds and valves.
    (iv) Gauge cylinder pressures.
(d) Activate the Breathing Gas Supplies
  (1) Regulator
    (i) Attach regulator to cylinder valve. Slowly open cylinder valve.
    (ii) Check for leaks.
    (iii) Check delivery - ensure breathing gas supply pressure is adequate to supply second stage.
    (iv) Close valve.
(e) Final Preparations

(1) Verify all necessary records, logs, timing modes, and timesheets are at the dive station.
(2) Check that all appropriate decompression and treatment tables and protocols are in hand.

5.3.6 Hookah Dive Operation Checklist

(a) Dive Briefing
- (1) Dive Objective(s).
- (2) Time & Depth.
- (3) Task &Team Assignments.
- (4) Tools & Techniques.
- (5) Hazards & Conditions.
- (6) Emergency Procedures (aborted dive, injured diver).

(b) Hookah Pre-dive Inspection
- (1) Check Divers (mental and physically prepared).
- (2) Check Equipment (Mask, Fins, Gloves, Hood, etc.).
- (3) Check Primary Air pressure, note accordingly.
- (4) Check RGS pressure, note accordingly.
- (5) Check Secure Harness.
- (6) Check Weight Belt.
- (7) Check gas line (snap secure and proper routing).
- (8) Diver Gas Check (primary and RGS).
- (9) Close RGS valve.
- (10) Review Dive Plan (questions).
- (11) Assist Diver to Entry Point.
- (12) OK Diver to enter water.
- (13) Start Descent MARK TIME.

(c) Post Dive Procedures
- (1) Debrief divers.
- (2) Check the diver's physical condition.
- (3) Record Dive (on permanent record).

5.3.7 Other Requirements

If application of specific regulations is not clear, compliance will be based on one or both of the following:

(a) The regulations that promote the greater safety of divers.
(b) The DSO's decision as to safety and need.

5.4 Surface-supplied Air Diving

TAMU-CC dive operations employing surface-supplied diving will comply with the following requirements.

5.4.1 Defined

Surface-supplied diving is a diving mode in which the diver is supplied compressed gas for breathing from the surface dive location and is in voice communication with the surface.

5.4.2 Limitations

(a) The following are minimum requirements for TAMU-CC Surface Supply Diving Operations:
- (1) The approximate depth of each dive will be determined prior to the start of operations.
- (2) A weight belt appropriate for the dress and depth of the dive will be worn.
- (3) A separate safety harness with a positive buckling device will be worn. The harness will distribute the load on the diver's body, and will prevent

any strain from being placed on the diver's mask or helmet when the umbilical attached to the lift ring on the harness is pulled.

(4) Surface-supplied dives will not exceed 190 feet.

(5) A decompression chamber will be ready for use at the dive location for any dive:

(i) Outside the no-decompression limits.

(ii) Deeper than 100 feet.

(iii) Deemed "working" and using gas mixtures other than air (Section 5.4).

(6) Each surface-supplied diver will be continuously tended by a dive team member while in the water.

NOTE: For dives deeper than 100 feet, outside the no-decompression limits, or when using mix gas, a separate dive team member will tend each diver in the water.

(7) An RGS will be provided for each diver.

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

(9) A dive location reserve breathing gas supply will be provided.

(10) An operational two-way voice communication system will be used between each surface-supplied diver and dive team member at the dive location.

(11) Although voice communication with the surface tender is the primary means of communication, both divers and tenders will know and implement line-pull signals in case of communication equipment failure.

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

(13) A standby diver will be available at the dive location while a diver is in the water.

5.4.3 Personnel Requirements

The following are minimum personnel requirements for Surface-Supplied dive operations. Task assignments will comply with Section 4.20.3.

NOTE: The Lead Diver or DPIC may switch task assignments between dive team members on a dive operation as needed, provided they have the training and experience to assume the new role, and another person with equivalent experience and training takes their place.

Dives deemed "Working" or "Scientific" (Section 1.1.1)

(a) All surface supply dives regardless of depth.

(1) Minimum number of team members required for surface supplied is three (3).

(2) Required dive team task assignments; 1 Lead/DPIC, 1 Standby Diver[1,2], 1 Tender[1], and 1 Diver.

NOTES:

[1] The Lead Diver or DPIC may be assigned and assume this role provided they are trained and qualified.

[2] A single Standby Diver must be tethered. If not tethered, two Standby divers are required increasing the dive team total by one.

5.4.4 Minimum Equipment

The minimum equipment required for Surface-supplied diving:

(a) An adequate gas source with appropriate volume to support diver(s).

(b) Check that gas supplies comply with equipment regulations as outlined in Section 7.0. (i.e. cylinders 7.1.1, Compressors 7.5, and Gas Quality Standards 7.6).
(c) Dive location, reserve gas source of appropriate volume to support complete diver evacuation.
(d) Umbilical/diving hose group, consisting of:
  (1) Gas supply hose.
  (2) Strength member.
  (3) Communications cable.
(e) A means of determining the diver depth.
(f) Decompression and treatment tables.
(g) TAMU-CC Diving Standards for Underwater Operations (working dives only).
(h) Control Station consisting of:
  (1) Communications system.
  (2) Gas Control Panel.
(i) Diving Ladder or other safe means of exiting diver from the water.
(j) Diver's personal diving equipment consisting of:
  (1) Helmet or mask.
  (2) Safety harness.
  (3) RGS.
  (4) Weight belt if appropriate.
  (5) Protective clothing/thermal protection.
  (6) Tools as required.
(k) Two time keeping devices (for surface personnel).
(l) First Aid kit.
(m) Emergency Oxygen Supply.
(n) Field Dive Log Sheets.
(o) Written Dive Plan applicable to the job to be conducted.

5.4.5 Pre-dive Checklist

(a) Equipment Preparation
  (1) Assemble, layout, and inspect all diving equipment and spares intended for the job. Check for wear; replace and repair as necessary.
  (2) Check all helmets and masks; ensure that they are within certification.
(b) General Equipment
  (1) Check accessory equipment – tools, lights, special systems, spares, etc. – are on site and in working order.
  (2) Check diver entry/exit ladder.
(c) Preparing Gas Supplies
  (1) Check that breathing gas supplies (primary and secondary) comply with regulations for purity and are properly mixed/filled to accommodate the dive mode and profile, including emergency decompression.
  (2) Check that gas supply is sufficient in volume to accommodate the diving mode, depth, and planned profiles, emergency decompression, and any accessory equipment.
  (3) Check over Bottom Pressure (OBP) is adequate for the intended depth and duration of the dive, will accommodate the helmet(s) or mask(s) as specified by the manufacturer and any accessory equipment.
  (4) Check that minimum flow requirements for helmet(s) and mask(s) are to manufacturer's specifications and will accommodate the diving contingent, including Standby Diver, and accessory equipment.
  (5) Verify gas supplies have a filtration system installed in the supply line between the source and the diver's hose connection on systems that utilize a gas compressor to provide gas supply to the diver.

(6) Verify all supply hoses running to and from the volume tank have proper leads, do not pass near high-heat areas, are free of kinks and bends, and are not exposed on deck in such a way that they can be rolled over, severed, or damaged by machinery or other means.

(d) Activate the Breathing Gas Supplies

(1) Volume Tank(s)

(i) Verify there is a properly functioning pressure gauge and the compressor meets delivery requirements.

(ii) Check valves and connections, petcocks, filler caps, overflow points, bleed valves, and drain plugs for leakage or malfunction of any kind.

(2) Cylinders

(i) Verify availability and suitability of reserve cylinders.

(ii) Check valves for proper operation and delivery.

(iii) Gauge cylinders for sufficient pressure.

(3) Breathing Gas Hoses

(i) Verify all high-pressure supply hoses have safety lines attached and strain relief devices properly installed.

(ii) Ensure all hoses have a clear lead and are protected from excessive heating or physical damage.

(iii) Briefly blow through hoses prior to connection.

(iv) Check breathing gas hoses and fittings for leaks and flow.

(v) Ensure breathing gas hoses (umbilical) are suitable for the gasses to be used and have been maintained in proper conditions of cleanliness.

(e) Test Equipment with Activated Breathing Gas Supply

(1) Check all exhaust and non-return valves.

(2) Hook up all breathing gas hoses to helmets and masks; make necessary connections to supply manifold.

(3) Ensure breathing gas supply is suitable for depth and diving mode.

(4) Verify flow to helmets and masks.

(5) Hook up and test all communications.

(f) Final Preparations

(1) Verify all necessary records, logs, timing modes, and timesheets are at the dive station.

(2) Check that all appropriate decompression and treatment tables and protocols are in hand.

5.4.6 Surface-supply Dive Operation Checklist

(a) Dive Briefing

(1) Dive Objective(s).

(2) Time & Depth.

(3) Task &Team Assignments.

(4) Tools & Techniques.

(5) Hazards & Conditions.

(6) Emergency Procedures (aborted dive, injured diver).

(b) Scuba Pre-dive Inspection

(1) Check Divers (mental and physically prepared).

(2) Check Equipment (Mask, Fins, Gloves, Hood, etc.).

(3) Check Primary Air.

(4) Check Secondary Air.

(5) Check Reserve Air.

(6) Check Secure Harness.

(7) Check Weight Belt (outside of all other belts).

(8) Check Umbilical (snap secure and proper routing).
(9) Diver Air Check (primary, purge, RGS, & Ears).
(10) Check Communications.
(11) Review Dive Plan (questions).
(12) Assist Diver to Entry Point.
(13) OK Diver to enter water.
(14) Start Descent MARK TIME.

(c) Post Dive Procedures

(1) Debrief divers.
(2) Check the diver's physical condition.
(3) Record Dive (on permanent record).

5.4.7 Other Requirements

If application of specific regulations is not clear, compliance will be based on one or both of the following:

(a) The regulations that promote the greater safety of divers.
(b) The DSO's decision as to safety and need.
(c) Hookah diving in aquariums or confined water environments:

(1) Hookah Diving in Aquariums or Confined Water Environment: In an aquarium habitat or confined water environment where the maximum depth is known and planned for, a depth gauge is not required.
(2) The maximum obtainable depth of the aquarium may be used as the maximum diving depth.

5.5 AIR-ALTERNATIVE GAS DIVING (AAG)

The following guidelines address the use of AAG under TAMU-CC auspices as approved by the DCB.

5.5.1 Gasses Defined

For these standards:

(a) Air - Per CGA standard (Section 7.6) air is a gas mixture of 21-22% oxygen, ~78% nitrogen, and ~1% trace gasses. These compressed air standards, will be met whenever air is:

(1) Placed in contact with oxygen concentrations >40%.
(2) Used in Nitrox production by the partial pressure mixing method with gas mixtures containing >40% oxygen as the enriching agent.

(b) Oxygen - Two grades of oxygen are approved for use in TAMU-CC dive operations:

(1) Medical Grade - 99% oxygen content, is regulated as prescription drug, and maximum CO and CO2 levels are guaranteed.
(2) Aviation Grade - Is optional, is 99.5% oxygen content, tested for moisture content.

(c) Nitrox - A gas mixture being comprised of an oxygen concentration higher than 22% by volume.
(d) Mixed-gas - A gas mixture composed of oxygen and an additional inert gas – >1% by volume – other than nitrogen.

NOTE: AAG Dive Plans will be approved by the DSO/DCB on a case by case basis with the exception of Nitrox, up to 40% 02.

5.5.2 Limitations

Employment of AAG, dive procedures, and protocols will first adhere to the criteria addressed throughout this standard as they apply to dives using "air". Additionally, AAG dives will meet the following criteria:

(a) Scientific Dives

(1) The divers will be previously certified and authorized to dive the gasses, as defined in Section 5.4.1(a-d) and proposed by a DCB approved internationally recognized agency.

(2) If the intended dives will require decompression, divers will be previously certified and authorized in decompression diving per requirements in Section 5.5 and the dive plan has approval by the DCB.

(3) Divers will demonstrate to the DCB's satisfaction skills, knowledge, and attitude appropriate in the safe use of AAG.

(b) Working Dives with AAG will meet the following additional requirements:

(1) A decompression chamber will be at the dive location and ready use.

(2) A bell will be used when depths exceed 220 feet, alternatively, an in-water stage will be provided on dives >100 feet or outside no-decompression limits.

(3) When in-water decompression exceeds 120 minutes.

(c) Choice of breathing gas mixture will be weighed against proposed depth (Section 3.2), and in all cases, the following will apply:

(1) Maximum Operating Depth (MOD) per a given gas mixture will be determined by a working PPO2 of ≤1.4 and a resting PPO2 of ≤1.6.

(2) An Equivalent Air Depth (EAD) of ≤130 feet.

5.5.3 Prerequisites

(a) Eligibility

(1) Active divers of approved status (Sections 2.0 and 3.0) and currently diving under the auspices of TAMU-CC are eligible to apply for authorization to use AAG.

(2) Additionally, in the case of Mixed-gas Diving, Nitrox certification and authorization is required.

(b) Application and Documentation

(1) Application for authorization to use AAG technology will be made per requirements for dive status, outlined in Sections 1.3.5 and 2.1.1, and via Appendices 1.A and 2.A.

5.5.4 Requirements for Authorization to Use Air-alternative Gas

(a) Final Approval

(1) Submission of documents and/or certifications does not authorize a diver to use AAG technology under the auspice of TAMU-CC. Divers using mixed gasses must have taken proper and recognized training to be authorized to dive such gas mixes and then approved by the DSO with recommendation from the DCB if needed.

(2) After application approval, an applicant will be authorized to dive AAG within their certification and depth authorization, as specified in Section 3.2.

(b) Minimum Activity to Maintain Authorization

(1) Authorization to dive AAG may be rescinded for any diver not demonstrating to the satisfaction of the DSO or DCB appropriate judgment or proficiency to ensure their safety or that of other divers.

(2) The diver will log at least one AAG dive per year.

(3) Failure to meet the minimum activity level may be cause for restriction or revocation of a mixed-gas authorization.

5.5.5 Air-alternative Gas Training Requirements

(a) General

Prior to obtaining authorization to use AAG, the following minimum requirements will be met:

(1) The diver will complete additional theoretical and practical training beyond the air certification level (Section 2.0 and 3.0) and be to the satisfaction of the TAMU-CC DCB and DSO. This training may be used to satisfy the SD training requirements outlined in Section 3.1.2.

(2) Each diver will demonstrate proficiency in skills and theory via:

(i) Written examinations covering the information presented in the classroom training session(s) (e.g., gas theory, oxygen toxicity, partial pressure determination, etc.).

(ii) Practical examinations covering the information presented in the practical training session(s) (e.g., gas analysis, documentation procedures, etc.).

(iii) Open water checkout dives, to appropriate depths, to demonstrate the application of theoretical and practical skills learned.

(b) Nitrox Training Guidelines

(1) Divers can be authorized to dive Nitrox with a certification from an internationally recognized training agency. If the diver does not have a Nitrox certification, TAMU-CC can offer Nitrox training under the auspice of AAUS by completing the requirements in section 5.5.5(b)(2-5), below.

(2) Classroom Instruction

Topics will include, but are not limited to:

(i) Review of previous training; physical gas laws pertaining to Nitrox; partial pressure calculations and limits; equivalent air depth (EAD) concept and calculations.

(ii) Oxygen physiology and oxygen toxicity; calculation of oxygen exposure and maximum safe operating depth (MOD).

(iii) Determination of decompression schedules (both by EAD method using approved air dive tables, and using approved Nitrox dive tables).

(iv) Dive planning and emergency procedures; mixing procedures and calculations.

(v) Gas analysis.

(vi) Personnel requirements.

(vii) Equipment marking and maintenance requirements.

(viii) Dive station requirements.

(ix) The TAMU-CC DCB may choose to limit standard Nitrox diver training to procedures applicable to diving, subsequently reserve training such as Nitrox production methods, oxygen cleaning, and dive station topics to divers requiring specialized authorization in these areas.

(3) Practical Training

Practical training will consist of the following:

(i) Oxygen analysis and logging of Nitrox mixtures.

(ii) Determination of MOD, oxygen partial pressure exposure, and oxygen toxicity time limits, for various Nitrox mixtures at various depths.

(iii) Determination of nitrogen-based dive limits status by EAD method using air dive tables, Nitrox dive tables, and gas mixing software as approved by the DCB.

(iv) Dive computer use may be included, as approved by the DCB (Sections 5.4.7(d), 5.6, and 7.1.3).

(4) Written Examination

Before authorization, the trainee will successfully pass a written examination demonstrating knowledge of at least the following:

(i) Function, care, use, and maintenance of equipment cleaned for Nitrox use.
(ii) Physical and physiological considerations of Nitrox diving (e.g. O2 and CO2 toxicity).
(iii) Diving regulations and procedures as related to Nitrox diving, either scuba or surface-supplied (depending on intended mode).
(iv) Given the proper information, calculation of:
- Equivalent air depth (EAD) for a given fO2 and actual depth.
- PPO2 exposure for a given fO2 and depth;
- Optimal gas mixture for a given PPO2 exposure limit and planned depth;
- Maximum operational depth (MOD) for a given mix and PPO2 exposure limit;
- For Nitrox production purposes, percentages/psi of oxygen in a given mixture, and psi of each gas required to produce a fO2 by partial pressure mixing.

(v) Dive table and dive computer selection and usage.
(vi) Nitrox production methods and considerations.
(vii) Oxygen analysis.
(viii) Nitrox operational guidelines (Section 5.4), dive planning, and dive station components.

(5) Open water Dives

(i) A minimum of two supervised open-water dives using Nitrox technology is required for authorization. The mode used in the dives will correspond to the intended application (i.e., scuba or surface-supplied).
(ii) If the MOD for the mix being used can be exceeded at the training location, direct, in-water supervision is required.

(c) Mixed-gas Training Guidelines

(1) Classroom Instruction

(i) Review of topics and issues previously outlined in Nitrox and required decompression diving training as pertinent to the planned operations.
(ii) The use of helium or other inert gases, and the use of multiple decompression gases.
(iii) Equipment configurations.
(iv) Mixed-gas decompression planning.
(v) Gas management planning.
(vi) Thermal considerations.
(vii) Mission planning and logistics.
(viii) Emergency procedures.
(ix) Mixed-gas production methods.
(x) Methods of gas handling and cylinder filling.
(xi) Oxygen exposure management.
(xii) Mixed-gas physics and physiology.

(2) Practical Training:

(i) END determination.
(ii) Gas analysis.
(iii) Confined water session(s) in which divers demonstrate proficiency in required skills and techniques for proposed diving operations.

(3) Open water Dives

(i) A minimum of six open-water training dives.
(ii) At least one initial dive will be in 130 feet or less to practice equipment handling and emergency procedures.
(iii) Subsequent dives will gradually increase in depth, with a majority of the training dives being conducted between 130 feet and the planned operational depth.
(iv) Planned operational depth for initial training dives will not exceed 260 feet.
(v) Diving operations beyond 260 feet require additional training dives.
(vi) Review of topics.

(d) Surface-Supplied Training

All training as applied to surface-supplied diving (practical, classroom, and open-water) will follow the surface-supplied diving standards (Section 5.3), including additions listed in Section 5.4.

5.5.6 Air-alternative Gas Dive Personnel Requirements

(a) Diver-in-Training – a diver who has completed the requirements of Sections 2.0 and the authorization and training sections of these guidelines (Section 5.4.4 and 5.4.5), may be authorized by the DCB and DSO to use AAG (per certification – e.g. Nitrox or mixed-gas) under the direct supervision of another diver who holds the equivalent AAG authorization. Dive depths are restricted to those specified in the diver's authorization.

(b) Scientific Diver – a diver who has completed the requirements of Section 3.1.2 and the training and authorization sections of these guidelines (Section 5.4.4 and 5.4.5) may be authorized by the DCB and DSO to use AAG. Depth authorization to use AAG will be the same as those specified in the diver's authorization, as described in Section 3.2.

(c) Lead Diver/DPICs– on any dive during which AAG will be used by any team member, will be qualified to assume the roles as outlined in Section 4.19.3(a) and (b) and will have completed the authorization and training sections of these guidelines (Section 5.4.4 and 5.4.5). Lead Diver/DPIC role assignments will be approved prior to project commencement by the DCB and/or DSO as part of the Dive Plan approval process.

In addition to the responsibilities listed in Section 4.19.3(a) and (b), the Lead Diver or DPICs will:

(1) As part of the dive planning process, verify all divers using AAG on a dive are properly qualified and authorized.
(2) As part of the pre-dive procedures, confirm with each diver the gas mixture(s) the diver is using, and establish dive team maximum depth and time limits, according to the shortest time limit or shallowest depth limit among the team members.
(3) The Lead Diver or DPIC will also reduce the maximum allowable PPO2 exposure limit for the dive team if on-site conditions so indicate (Section 5.4.7(a)(2)).

5.5.7 Dive Parameters

(a) Oxygen Exposure Limits

(1) The inspired oxygen partial pressure experienced at depth will not exceed 1.4 ATA while at working (e.g. swimming) and 1.6 ATA when at rest (e.g. during decompression).

(2) The maximum allowable exposure limit will be reduced in cases where cold or strenuous dive conditions, or extended exposure times are expected. The DCB will consider this in the review of any dive plan application, which proposes the use of AAG. The Lead Diver or DPIC will also review on-site conditions and reduce the allowable PPO2 exposure limits if conditions indicate.

(3) If using the equivalent air depth (EAD) method the maximum depth of a dive will be based on the oxygen partial pressure for the specific breathing gas used. NOTE: TAMU-CC standing policy for EAD/END, in all dives, regardless of gas used will be ≤130 feet.

(b) Bottom Time Limits

(1) Maximum bottom time will be based on the depth of the dive and the gas mixture(s) being used.

(2) Bottom time for a single dive will not exceed the NOAA maximum allowable “Single Exposure Limit” for a given oxygen partial pressure, as listed in the current NOAA Diving Manual.

(c) Dive Tables and Gases

(1) A set of DCB approved dive tables will be available at the dive site.

(2) When using the equivalent air depth (EAD) method, dives will be conducted using air dive tables.

(3) If AAG’s are used to increase the safety margin of air-based dive tables, the MOD and oxygen exposure and time limits for the gas mixtures being dived will not be exceeded.

(4) Breathing mixtures used while performing in-water decompression, or for bailout purposes, will contain the same or greater oxygen content as that being used during the dive, within the confines of depth limitations and oxygen partial pressure limits set forth above (Section 5.4.7(a)(1)).

(d) Dive Computers

(1) Computers may be used to compute decompression status during AAG dives. Manufacturers’ guidelines and operations instructions will be followed.

(2) Use of dive computers will comply with the guidelines as outlined in Section 5.6.

(3) Computer users will demonstrate a clear understanding of the display, operations, and manipulation of the unit being used for diving prior to using the computer, to the satisfaction of the DSO or designee.

(4) If AAG is used to increase the safety margin of an air-based dive computer, the MOD and oxygen exposure and time limits for the gas mixture being dived will not be exceeded.

(5) Dive computers capable of PPO2 limit and fO2 adjustment will be checked by the diver prior to the start each dive to assure compatibility with the gas mixture being used.

(e) Repetitive Diving

(1) Repetitive dives using AAG will be performed in compliance with procedures required of the specific dive tables used.

(2) Residual nitrogen time will be based on the EAD/END for the specific gas mixture to be used on the repetitive dive, and not that of the previous dive.

(3) The total cumulative exposure (bottom time) to a partial pressure of oxygen in a given 24 hour period will not exceed the current NOAA Diving Manual 24-hour Oxygen Partial Pressure Limits for "Normal" Exposures.

(4) When repetitive dives expose divers to different oxygen partial pressures from dive to dive, divers will account for accumulated oxygen exposure from previous dives when determining acceptable exposures for repetitive dives. Both acute (CNS) and chronic (pulmonary) oxygen toxicity concerns will be addressed and divers will be monitored continuously for signs of O2 toxicity.

(f) Gas Mixing and Analysis for Organizational Members

(1) Personnel Requirements.

(i) Individuals responsible for producing and/or analyzing gas mixtures will be knowledgeable and experienced in all aspects of the technique.

(ii) Only individuals approved by the DSO and/or DCB will be responsible for mixing and/or analyzing gas mixtures.

(2) Production Methods - It is the responsibility of the DCB to approve the specific gas production method used.

(3) Analysis Verification by User.

(i) It is the responsibility of each diver (Scuba), and Lead Diver or DPIC (surface supply) to analyze, prior to the dive, the oxygen content of all cylinders and acknowledge in writing the following information for each vessel: fO2, MOD, vessel pressure, date of analysis, and analyzer's name/initials.

(ii) Individual dive log reporting forms will report fO2 of the Nitrox mix, if different from 21%, and the fHe if mixed-gas is used.

5.5.8 Air-alternative Gas Diving Equipment

All diver and support equipment should be suitable for the fO2 being used. Due to the added complexities involved in the use of AAG technologies, (e.g. higher than normal fO2's and the addition of other inert gasses, e.g. Helium), special attention will be placed on meeting ALL of the equipment criteria as outlined in Section 7.0.

5.6 STAGED DECOMPRESSION DIVING

Decompression diving is defined as any diving during which the diver cannot perform a direct return to the surface without performing a mandatory decompression stop to allow the release of inert gas from the diver's body. The following procedures must be observed when conducting dives requiring planned decompression stops.

5.6.1 Minimum Experience and Training Requirements

(a) Prerequisites

(1) SD qualification according to Section 3.1.2.

(2) Minimum of 100 logged dives.

(3) Demonstration of the ability to safely plan and conduct dives deeper than 100 feet.

(4) Nitrox certification/authorization in accordance to the requirements outlined in Section 5.4.

(b) Training

(1) A minimum of 6 hours of classroom training to ensure theoretical knowledge to include: physics and physiology of decompression; decompression planning and procedures; gas management; equipment configurations; decompression method, emergency procedures, and omitted decompression.

(2) At least one training session will be conducted in a pool or sheltered water setting, to cover equipment handling and familiarization,

swimming and buoyancy control, to estimate gas consumption rates, and to practice emergency procedures.

(3) A minimum of six open-water training dives simulating/requiring decompression must be conducted, emphasizing planning and execution of required decompression dives, and including practice of emergency procedures.

(4) Progression to greater depths must be by 4-dive increments at depth intervals as specified in Section 3.2.2.

(5) No training dives requiring decompression will be conducted until the diver has demonstrated acceptable skills under simulated conditions.

(6) The following are the minimum skills the diver must demonstrate proficiently during dives simulating and requiring decompression:

(i) Buoyancy control.
(ii) Proper ascent rate.
(iii) Proper depth control.
(iv) Equipment manipulation.
(v) Stage/decompression cylinder use as pertinent to planned diving operation.
(vi) Buddy skills.
(vii) Gas management.
(viii) Time management.
(ix) Task loading.
(x) Emergency skills.

(7) Divers will demonstrate to the satisfaction of the DSO, or qualified designee, proficiency in planning and executing required decompression dives appropriate to the conditions in which diving operations are to be conducted.

(8) Upon completion of training, the diver shall be authorized to conduct required decompression dives with DSO approval.

5.6.2 Minimum Equipment Requirements

(a) Valve and regulator systems for primary (bottom) gas supplies must be configured in a redundant manner that allows continuous breathing gas delivery in the event of failure of any one component of the regulator/valve system.

(b) Cylinder volume and configuration will be adequate for planned dive operation.

(c) One of the second stages on the primary gas supply must be configured with a hose of adequate length to facilitate effective emergency gas sharing in the intended environment.

(d) Minimum dive equipment shall include:

(1) Snorkel is optional at the DCB's discretion, as determined by the conditions and environment.
(2) Diver location devices adequate for the planned diving operations and environment.
(3) Compass.

(e) Redundancy in the following components is desirable or required at the discretion of the DCB or DSO.

(1) Decompression Schedules.
(2) Dive Timing Devices.
(3) Depth Gauges.
(4) Buoyancy Control Devices.
(5) Cutting Devices.
(6) Lift Bags and Line Reels.

5.6.3 Minimum Operational Requirements

(a) Approval of dive plan applications to conduct required decompression dives shall be on a case- by-case basis.

(b) The maximum pO2 to be used for planning required decompression dives is 1.6. It is recommended that a pO2 of less than 1.6 be used during bottom exposure.
(c) Diver's gas supplies must be adequate to meet planned operational requirements and foreseeable emergencies.
(d) Decompression dives may be planned using dive tables, dive computers, and/or PC software approved by the DSO/DCB.
(e) Breathing gases used while performing in-water decompression must contain the same or greater oxygen content as that used during the bottom phase of the dive.
(f) The dive team prior to each dive must review emergency procedures appropriate for the planned dive.
(g) If breathing gas mixtures other than air are used for required decompression, their use must be in accordance with those regulations set forth in the appropriate sections of this standard.
(h) The maximum depth for required decompression using air as the bottom gas is 190 feet.
(i) Use of additional Nitrox and/or high-oxygen fraction decompression mixtures as travel and decompression gases to decrease decompression obligations is encouraged.
(j) Use of alternate inert gas mixtures to limit narcosis is encouraged for depths greater than 150 feet.
(k) If a period of more than 6 months has elapsed since the last decompression dive, a series of progressive workup dives to return the diver(s) to proficiency status prior to the start of project diving operations are recommended.
(l) Workload specific workup dives are recommended.

5.7 DIVE COMPUTER DIVING

The following are minimum considerations for the use of dive computers.

(a) Only those makes and models of dive computers specifically approved by the TAMU-CC DCB/DSO may be used.
(b) Any diver desiring the approval to use a dive computer as a means of determining decompression status must apply to the DCB/DSO, complete an appropriate practical training session, and pass a written examination.
(c) Each diver relying on a dive computer to plan dives and indicate or determine decompression status must utilize a unit in which they are approved to operate.
(d) On any given dive, divers in the buddy team will follow the most conservative dive computer.
(e) If the dive computer fails at any time during the dive, the dive will be terminated and appropriate surfacing procedures will be initiated.
(f) A diver will not dive for 18 hours before activating a dive computer to use it to control their diving, or until the computer indicates complete off-gassing has occurred.
(g) Once the dive computer is in use, it must not be switched off until it indicates complete off-gassing has occurred or 18 hours have elapsed, whichever comes first.
(h) When using a dive computer, non-emergency ascents will be at a rate specified for the make and model of dive computer being used.
(i) Whenever practical, divers using a dive computer should make a stop between 10 and 30 feet for 5 minutes, especially for dives below 60 fsw.
(j) Multiple deep dives require special consideration.

Section 6.0

Records and Record Keeping

6.0 RECORDS AND RECORDKEEPING

6.1 DIVE EQUIPMENT RECORDS

See Section 7.3, Equipment Testing and Record Keeping.

6.2 MEDICAL RECORDS

See Section 8.5, Medical Records (Section 8.0) will be kept for five years per OSHA CFR 1910.440(b)(3)(i).

6.3 OPERATIONAL DIVE LOG

During each dive operation the following information will be recorded (Appendix 6.A):

(a) Name of Lead Diver or DPIC.
(b) Divers name(s).
(c) Buddy(ies)/tender.
(d) Water entry, exit, and total dive time.
(e) Gas pressure at beginning and end of dive, and total gas expended.
(f) Maximum depth.
(g) Approximate underwater and surface conditions (visibility, water temperature, and current, etc.).

6.4 OPERATIONAL DIVE RECORD

The Annual Statistics Form (Appendix 6.B) is a summation of all dives under TAMU-CC's auspice. At the conclusion of each dive operation, including completion of decompression procedure assessments where there has been an incident of decompression sickness, the following information will be permanently recorded:

(a) Names of dive team members, including the Lead Diver or DPIC.
(b) Date, time, and location.
(c) Diving modes used.
(d) General nature of work performed.
(e) Approximate underwater and surface conditions (visibility, water temperature, current, etc.)
(f) Maximum depth and bottom time of each diver.
(g) For each dive outside of the no-decompression limits, deeper than 130 feet or using mixed-gas (excluding Nitrox up to EAN40), the following additional information will be recorded and maintained:
    (1) Depth-time and breathing gas profile.
    (2) Decompression table designation (including modification).
    (3) Elapsed time since last exposure if less than 24 hours or repetitive dive designation for each diver.
(h) For each dive in which decompression sickness is suspected or symptoms are evident, the following additional information will be recorded and maintained:
    (1) Description of decompression sickness symptoms (including depth and time of onset).
    (2) Description and results of treatment.

6.5 PERSONAL DIVING LOG

Each diver will log every dive made under the auspices of TAMU-CC. Log sheets will be submitted to the DSO at the end of each month and will be placed in the diver's permanent file. The diving log will include the following:

(a) Name of diver, buddy /tender, and Lead Diver or DPIC.
(b) Date, time, and location.
(c) Maximum depth(s), bottom time(s), and surface interval.
(d) Purpose of dive(s).
(e) General nature of diving activity.
(f) Approximate surface and underwater conditions.
(g) Repetitive status of dives.
(h) Dive Mode (e.g. SCUBA, Surface-supplied).

(i) Mixed-gas profiles, if applicable.
(j) Dive tables or computer used.
(k) Detailed report of any accidents or potentially dangerous incidents.

6.6 RECORD MAINTENANCE

The DSO will maintain permanent records for all diving related matters under the auspices of Texas A&M University–Corpus Christi.
Diving personnel files will include, but not be limited to, the TAMU-CC diver application, dive logs, physical examination, waivers, certifications or understanding of diving and disciplinary actions and other pertinent information deemed necessary by the DCB and/or the DSO.

6.6.1 Availability of Records:

(a) Upon request of the Assistant Secretary of Labor for OSHA, or the Director, National Institute for Occupational Safety and Health, Department of Health and Human Services or their designees, TAMU-CC will make available for inspection and copying any record or document required by the OSHA standard.
(b) Records and documents required by OSHA Standard 29 CFR 1910 Subpart T will be provided upon request to employees, designated representatives, and the Assistant Secretary in accordance with 29 CFR 1910.20 (a)-(e), and (g).
(c) TAMU-CC Diving Standards for Underwater Operations, depth-time profiles, recordings of dives, (including decompression procedure assessments and evaluations) and records of hospitalizations will be provided in the same manner as employee exposure records or analyses using exposure or medical records. Equipment inspections and testing records that pertain to employees will also be provided upon request to employees and their designated representatives.
(d) Records and documents required by Texas A&M University - Corpus Christi, OSHA Standard 29 CFR, and AAUS will be retained for the following period:
    (1) Physician reports of diver medical examinations – minimum of five years after date of last hyperbaric exposure.
    (2) TAMU-CC Diving Standards for Underwater Operations – current document only.
    (3) Depth-time profile until the completion of the recording of dive, or until completion of decompression procedure assessment, where there has been an incident of decompression sickness.
    (4) Record of dive – minimum of one year, five years where there has been an accident or pressure-related injury or incidence of non-compliance with university rules.
    (5) Pressure-related injury assessment - five years.
    (6) Equipment inspection and testing records - current entry or tag, or until equipment is withdrawn from service.
    (7) Records of hospitalization - five years.
    (8) After the expiration of the retention period of any record required to be kept for five (5) years, TAMU-CC will forward such records to OSHA, Department of Health and Human Services. TAMU-CC will also comply with any additional requirements set forth at 29 CFR 1910.20(h).
    (9) Diver training records – Minimum of 1 year beyond the life of the diver's program participation.
    (10) Diver authorization(s) – Minimum of 1 year beyond the life of the diver's program participation.
    (11) Reports of disciplinary actions by the DCB – Minimum of 1 year beyond the life of the diver's program participation.

6.7 TERMINATION OF DIVE PROGRAM

In the event the Texas A&M University–Corpus Christi dive program ceases to exist:

(a) The successor employer will receive and retain all dive and employee medical records required by 29 CFR 1910.

(b) If there is no successor employer, dive, and employee medical records will be forwarded to the National Institute for Occupational Safety and Health, Department of Health and Human Service.

APPENDIX 6.A
OPERATIONAL DIVE LOG

Texas A&M University - Corpus Christi
APPENDIX 6.A - OPERATIONAL DIVE LOG

Date _____

Page ___ of ___

Location _____ Site _____

DPIC/Lead													
Safety Diver(s)													
Diver's Name													
Gas Mixture (O2/N/He)													
Dive Designation (a-z)													
Prev. Rep. Group.													
Surface Interval													
New Rep. Group.													
Planned Max. Depth													
No-Decomp. Limit													
Resid. Nitrog. Time													
Adj. No-Deco Time													
Planned In Water Time													
Diver's Initials													
Entry Time													
Exit Time													
Underwater Time													
Ascent Time													
Bottom Time													
Maximum Depth													
Repetitive Group.													
Cylinder Size													
Cylinder Press. In													
Cylinder Press. Out													
Gas Expended													

Check the following that apply:

	Purpose		Structure
___	Science		**Temperature**
___	Working	___	Tropical
___	Training	___	Temperate
___	Proficiency	___	Cold
___	Recreational		**Overhead**
	Dive Mode	___	Ice
___	SCUBA	___	Cave/rn
___	Surface Supply	___	Wreck
___	Rebreather		**Specialties**
___	Hookah	___	Low Visibility
	Dive Planner	___	Current
___	Table	___	Oil/Gas Rig
___	Computer	___	Artificial Reef
___	Software	___	Night
	Environment	___	Research
___	Saltwater	___	Collection
___	Freshwater	___	Photography
___	Open Water	___	Navigation
___	Confined Water	___	Altitude
	Entry	___	Search/Recovery
___	Shore	___	Rescue
___	Boat	___	Accident Mgmt.
___	Platform	___	Decompression
___	Other	___	Blue Water
	Descent	___	Aquarium
___	Down-line		**Special Equipment**
___	Free Descent	___	Dry Suit
	Work Site Position	___	Full Face Mask
___	Bottom Orient.	___	Hard Hat
___	Water Column	___	Communications

APPENDIX 6.B

OPERATIONAL DIVE RECORD – ANNUAL STATISTICS FORM

Dives By Purpose	Dive Times	Dives Logged	# of Divers Logging Dives
Scientific			
Working			
Training & Proficiency			
Non-Duty / Recreational			

Dives By Mode	Dive Times	Dives Logged	# of Divers Logging Dives
Open Circuit SCUBA			
Surface Supplied			
Rebreathers			
Hookah			
Other			

Dives By Breathing Gas	Dive Times	Dives Logged	# of Divers Logging Dives
Air			
Nitrox			
Trimix			

Dives By Profiling Method	Dive Times	Dives Logged	# of Divers Logging Dives
Tables			
Computer			
Software			

Dives By Depth	Dive Times	Dives Logged	# of Divers Logging Dives
0 - 30			
31 - 60			
61 - 100			
101 - 130			
131 - 150			
151 - 190			
191 - >			

Dives By Environment	Dive Times	Dives Logged	# of Divers Logging Dives
Saltwater			
Fresh			
Open Water			
Confined Water			
Shore			
Boat			
Platform			
Other			
Buoyed Down line			
Free Descent			
Bottom Oriented			
Water Column			
Structure			
Tropical			
Temperate			
Cold			
Ice			
Cave/rn			
Wreck			
Low Vis			
Current			
Oil/Gas Rig			
Artificial Reef			
Night			
Research			
Collection			
Photography			
Navigation			
Altitude			
Search/Recovery			
Rescue			
Dive Acident Mangment			
Decompression			
Blue Water			
Saturation			
Aquarium			
Dry Suit			
Full Face Mask			
Hard Hat			
Communiucations			

Section 7.0

Equipment and Systems

7.0 EQUIPMENT AND SYSTEMS

The DCB and/or the DSO will approve the following equipment before it may be used for any dive activity under the auspices of TAMU-CC.

The use of university owned or controlled diving equipment will be limited to individuals officially participating in TAMU-CC dive programs, including those diving under temporary diving permit and reciprocity, and as specified in Section 3.0 (Diver Status). TAMU-CC divers may use university owned gear when diving under the auspice of another organization, via reciprocity or temporary diving permit, as long as they are trained and authorized to use each piece of gear.

TAMU-CC will not be held liable for the safety of persons involved in the unauthorized use of diving equipment.

7.1 DIVING EQUIPMENT

7.1.1 Cylinders and Valves

Cylinders and valves will:

(a) Be designed and constructed in accordance with the applicable provisions of the unfired Pressure Vessel Safety Orders, 29CFR 1910.101 and 1910.171.
(b) Be equipped with a pressure relief device.
(c) Be stored in a ventilated area and protected from excessive heat.
(d) Be secured from falling.
(e) Have shut off valves recessed into the cylinder or protected by a cap, except when in use, connected by manifold, or used for SCUBA diving.
(f) Be labeled of contents except when used for SCUBA Air diving and marked in an identifying manner.
(g) When used for mixed-gas Diving (Section 5.4) cylinders will also conform to the following criteria:

(1) General

(i) Cylinders will be free of all unnecessary stickers, banners, and markings.
(ii) Each cylinder will be marked horizontally on two sides with 3" high numbers indicating the MOD (Section 5.4.2(c)), e.g. "120".

NOTE: Oxygen cylinders will be marked horizontally with word "OXYGEN" to prevent confusion of cylinder MOD's of 70 or 120 feet.

(iii) Content information resulting from analysis will be placed at the neck of the cylinder and contain the:

- Percentage of O2 for oxygen or Nitrox mixes and the O2 and Inert gas percentages for mixed-gas.
- Date.
- Initials of the person analyzing the mixture.

(2) Alternative Labeling

(i) Dedicated Nitrox Service Cylinders:

- May be marked "NITROX", "EANx", or "Enriched Air".
- Nitrox identification color-coding will include a 4" wide green band around the cylinder, starting immediately below the shoulder curvature. If the cylinder is not yellow, the green band will be bordered above and below by a 1" yellow band.
- Other markings will have prior approval of the DCB.

7.1.2 Oxygen Analyzers

Oxygen analyzers:

(a) Are required when employing AAG technologies (Section 5.4), including Nitrox.
(b) Will be capable of determining the oxygen content in the cylinder.

(c) Are recommended to be used in pairs to reduce likelihood of errors due to a faulty analyzer.
(d) Will be capable of reading a scale of 0 to 100% oxygen, within 1% accuracy.

7.1.3 Dive Tables and Dive Computers

Dive tables and dive computers:

(a) Will be approved by the DCB and/or the DSO prior to the beginning of a project.
(b) Dive tables, appropriate for the dive project, regardless of the use of computers by the diver, will be available at the dive location at all times.
(c) If a dive computer is used the diver must use the same computer used on repetitive dives.

7.1.4 Flotation Devices

(a) Floatation devices will meet the following criteria:
  (1) Personal flotation systems, buoyancy compensators, dry suits, or other variable volume devices, will be equipped with an exhaust valve.
  (2) Each diver configured for SCUBA must have the capability of achieving and maintaining neutral buoyancy underwater and positive buoyancy at the surface.
(b) BCDs, dry suits, or other variable volume buoyancy compensation devices must not be used as a lifting device in lieu of lift bags.
(c) Additionally, floatation devices used in Working Diving applications and configured for SCUBA (Section 1.1.1) will have:
  (1) An inflation source separate from the breathing gas supply.
  (2) An oral inflation device.
  (3) A manually activated source of inflation, independent of the breathing supply.

7.1.5 Harnesses

Harnesses will:

(a) Be made of a suitable strength material to lift the diver and their equipment from the water.
(b) Have a positive buckling device.
(c) Have a mechanical quick release between them and the umbilical.
(d) Be constructed and fitted to prevent an unconscious diver from slipping free of the harness, or from strain being placed on mask or helmet.
(e) Not be used as a weight belt.
(f) Be designed to prevent restriction of the diver's breathing when their full weight is supported by the harness.
(g) Be equipped with a quick release when used to secure a cylinder to a diver in a SCUBA mode.

7.1.6 Helmets and Masks

Breathing masks and helmets will:

(a) Have a non-return valve at the attachment point between the helmet or mask and main gas supply hose, which will close readily and positively.
(b) Have an exhaust valve.
(c) Be capable of ventilating the required actual cubic feet per minutes (ACFM) of gas when supplied at the pressure recommended by the manufacturer of the equipment at any depth at which they are operated. NOTE: In all cases, the minimum required ventilation rate in ACFM will be in accordance with the manufacturer's design recommendations.
(d) Be capable of maintaining an inspired CO2 partial pressure below .02 ATA when the diver is producing carbon dioxide at the rate of 1.6 standard liters per minute.
(e) Be fitted with a two-way audio communications system on dives deemed "working" or when utilizing surface supply.

(f) Have check valves with springs not exceeding 3 psi cracking pressure.
(g) Be made of corrosion resistant materials.
(h) Be protected from over pressurization.

7.1.7 Hoses

Breathing supply hoses will:

(a) Have a Maximum Allowable Working Pressure (MAWP) equal to or greater than the maximum depth of the dive relative to supply source plus 150 psi.
(b) Have a rated bursting pressure at least equal to four times the MAWP.
(c) Have a MAWP and flow rating, no less than the system in which it is installed and be suitable for the service intended.
(d) Have connectors with pressure capabilities equal or greater than the hose on which they are installed.
(e) Be kink resistant and arranged to prevent kinking.
(f) Be suitable for breathing gas service.
(g) Have their open ends taped, capped, or plugged when not in use.
(h) Be designed not to collapse when used for operation with higher external pressure than internal.

Breathing-supply hose connectors will:

(a) Be made of corrosion-resistant materials.
(b) Have a working pressure at least equal to the working pressure of the hose to which they are attached.
(c) Be resistant to accidental disengagement.

Umbilicals will:

(a) Be marked in 10-foot increments to 100 feet beginning at the diver's end, and in 50-foot increments thereafter.
(b) Be marked with a unique identity and subject to a planned maintenance program (Section 7.3.6).
(c) Consist of a breathing gas hose, communications cable, a means of determining the diver’s depth, and strength member.
(d) Have strength members unaffected by immersion in water for extended periods.
(e) Have minimum break strength of the hose assembly, including terminating hardware, of 1000 lbs.

7.1.8 Regulators

SCUBA regulators must:

(a) Consist of a first stage and a second stage. A back-up second stage/octopus must be attached to the first stage for scientific diving applications in lieu of an independent reserve cylinder as required on working dives (Section 7.1.11).
(b) Second stages will be of a “downstream” design.
(c) Have a functional submersible pressure gauge.
(d) Be configured with an over pressure relief valve when used for tasks which second stages and other fail-safe mechanisms are not employed (i.e. dry suit inflation, lift bag work).
(e) Be cleaned and maintained for oxygen service, and marked in an identifying manner if used with gas mixtures containing >40% oxygen.
(f) Be suitable for the fO2 being used.
(g) Have an inflator hose for a Buoyancy Compensator Device.

7.1.9 Timing Devices, Depth and Pressure Gauges

Timing devices and gauges for divers allowing constant monitoring of dive depth, time, and gas availability will be chosen as appropriate to the diving mode.

(a) For SCUBA diving, each diver will have:
    (1) A depth gauge capable of being monitored by the diver during the dive.
    (2) A timing device capable of being monitored by the diver during the dive.

(i) An additional time keeping device will be available at each dive location.

(3) A cylinder pressure gauge capable of being monitored by the diver during the dive.

(b) For Surface-supplied diving:

(1) A gauge allowing monitoring of each diver's depth will be at the dive location, except when a known maximum depth attainable by the diver is used for all dive operation calculations.

(2) Gauges allowing monitoring of available gas will be at the dive site.

(3) Gauges utilized will:

(i) Be suitable for purpose intended.

(ii) When used to indicate a diver's depth will:

- Be of appropriate range and gradation.
- Graduated in units consistent with the decompression tables utilized.

(4) Two time keeping devices will be available at the dive location and will:

(i) Be suitable for the purpose and easily read.

(ii) Not be used when an error exceeding one quarter of one minute in four hours exists.

7.1.10 Weight Belts

The Diver's weight belt or assembly:

(a) Will be capable of quick release.

(b) Will be attached to the diver in such a manner to avoid accidental disengagement.

(c) Will, during dive operations:

(1) Be of sufficient weight to maintain the diver at working depth.

(2) Not be used as an attachment point for the diving umbilical.

7.1.11 Reserve Gas Supply (RGS)

A RGS will:

(a) Be independent of the primary gas supply.

(b) Be provided for all SCUBA, Hookah, and surface supplied dive operations as outlined in Sections 4 and 5, General and Specific Dive Operation Procedures.

(c) Have a cylinder meeting the requirements of paragraph 7.1.2 and 7.3.2.

(d) Have a regulator on the cylinder capable of delivering the proper pressure and flow to the divers, helmet, mask, or second stage regulator in accordance with the flow characteristics recommended by the manufacturer and additional requirements of over-bottom pressure.

(e) Have a means of attachment to a diver that prevents accidental disengagement.

(f) Will provide indication to the diver their reserve has been activated. Such indication can be the requirement of the diver to open a valve, a visual signal, or other appropriate method.

7.2 SUPPORT EQUIPMENT

7.2.1 Dive Flags/Warning Signals

When diving in areas capable of supporting marine traffic:

(a) A rigid replica of the blue and white international code flag "A" is required to be displayed during working dive operations. The dive flag must be at least 1 meter in height and flown in a manner allowing all around visibility and with illumination during night diving operations.

(b) A red and white "recreational" flag must be displayed during recreational and scientific dive operations. The "A" flag may be displayed in conjunction with the red and while "recreational" flag. The dive flags must be displayed prominently whenever

diving is conducted under circumstances where required or where water traffic is probable.

7.2.2 Diver Entry and Egress Systems

Entry and egress systems will:

(a) Be capable of supporting the weight of two divers plus their gear.
(b) Be made of corrosion resistant materials.
(c) Be suitable for the intended purpose.
(d) If, in the form of a ladder, will extend three feet below the surface when installed.

7.2.3 Emergency Equipment

(a) First Aid Kit must:
  (1) Be adequate for the dive operation, and will be on site and readily available during all dive operations.

(b) Emergency Oxygen Supply must:
  (1) Have a positive-pressure ventilator and a bag-type manual resuscitator with transparent mask or equivalent capable of ventilating an unconscious victim at the dive location.
  (2) Have regulators capable of supplying oxygen to two individuals simultaneously, one via a demand/positive pressure regulator and the other via a non-return, free-flow mask.
  (3) Hold a sufficient quantity of oxygen to supply two divers for:
    (i) The time required to transport them to a higher-level medical care facility; or
    (ii) 12 hours, whichever is less.
  (4) Have the regulator and positive pressure/demand regulators used to deliver oxygen tested annually to ensure delivery pressure is within the manufacturer's specifications.
  (5) Be available at the dive site during all dive operations.

7.3 AUXILIARY EQUIPMENT

The below outlined Auxiliary Equipment are examples of equipment and tools utilized by the scientific/working diver. These equipment and tools require DSO/DCB approval along with theoretical and practical training and evaluation by the DSO or their designee on proper and safe use prior to being deployed by a scientific/working diver for occupational diving purposes.

7.3.1 Sampling Equipment

See 12.0 Glossary for definition. Pertinent safety considerations:

(a) Many pieces of sampling equipment pose, either directly or indirectly, an entanglement hazard. A thorough assessment of the likelihood of entanglement for each piece of equipment along with the specific environmental conditions should be completed prior to the deployment of chosen sampling equipment. Cutting tools and diver communication in the event of entanglement must be discussed prior to the operation.
(b) Sampling equipment should be fitted with a means of safely transporting the equipment both on the surface and underwater to the dive location, i.e. clips, lines, bags, etc.
(c) When sampling equipment requires the use of surface support/personnel, a means of communication should be established between the diver(s) and topside personnel to ensure equipment can be energized/de-energized when needed.
(d) A review of the hazards associated with the specific sampling equipment should be included in the pre-dive planning process and briefings. Have a means of communication between the diver(s) and topside personnel to ensure equipment can be energized/de-energized when needed when it requires the use of surface support/personnel.

7.3.2 Spearguns and Polespears

See 12.0 Glossary for definition. Pertinent safety considerations:

(a) Not to be positioned in a tense, release mode unless the diver is actively targeting a specimen.

(b) Divers will only release/activate the polespear/speargun in the opposite direction of their dive buddy.

(c) Collection gear type should be appropriate for the targeted specimens to prevent any injuries. For example, if collecting lionfish, divers should use a collection container that is designed to hold the lionfish and prevent being stung by spines.

(d) Collecting roving animals may cause a diver to inadvertently swim away from their dive buddy, or exceed maximum operating depths. Divers must regularly assess that they are at an appropriate depth and distance to reach or assist their dive buddy in the case of an emergency.

(e) All effort must be taken to avoid damaging live benthic fauna (e.g., coral, sponges). Divers should position their spears to target the animal in the water column or release their spear when the targeted animal is near sand or bare rocks.

(f) Collections should be spread out across numerous and vast areas, when possible, to avoid the aggregation of large predatory animals in one location.

(g) In the case of aggressive large animals, dive buddies should position themselves close to one another and keep eyes on aggressive animals as they return to shore or other diving platform. If divers need to ascend to their boat, divers are to position themselves back-to-back so that aggressive animals can always be monitored by one of the divers. Use of the pole spear can be used to keep distance between the buddy team and the animal if they become too close.

(h) Divers should be cautious of entrapment hazards when fish attempt to hide in reef areas.

7.3.3 Cameras – Still and Video

See 12.0 Glossary for definition. Pertinent safety considerations:

(a) Avoid perceptual narrowing when using a camera for scientific work and reinforce dive safety concerns during pre-dive briefings, i.e. decompression and gas management, buddy awareness, etc.

(b) If utilizing a large camera, ensure proper buoyancy can be maintained throughout the planned scientific dive operations.

(c) Cameras should have an attachment point on the diver that is easily accessed so that (1) camera can be maintained if the diver releases the camera and (2) can be removed efficiently in the event of an emergency.

7.3.4 Dive Lights

See 12.0 Glossary for definition. Pertinent safety considerations:

(a) It is important to control the light whilst illuminated as to not temporarily blind yourself or others during a scientific dive operation.

(b) Care should be taken when preparing battery compartments to ensure these areas cannot become flooded during a dive, i.e. presence of clean, lubricated o-ring(s). This could result in fire concern.

    (1) Inspection of lights with rechargeable lithium batteries is also necessary to ensure the integrity of the light body is intact and will not flood.

(c) Lights, esp. those equipped with lithium ion batteries, shall follow the manufacturer's recommended charging procedures along with thorough inspection prior to and after the dive operation to ensure the integrity of the battery has been maintained.

7.3.5 Small Hand Tools

See 12.0 Glossary for definition. Pertinent safety considerations:

(a) Divers should be familiar with the proper use and safe operation of the tools they will be utilizing.
(b) Tools should be carried in a bag or tethered to the diver to avoid dropping
(c) Divers should not use tools as weighting.
(d) Divers should avoid carrying excessive amounts of tools that may affect buoyancy control.
(e) Divers should be aware of potential hazards utilizing the tool (impact injuries, sharp edges, etc.).
(f) Divers should be aware of the impact of the use of the tools on the surrounding environment.

7.3.6 Handheld Underwater Power Tools

See 12.0 Glossary for definition. Pertinent safety considerations:

(a) Tools supplied with power from the surface must be de-energized before being placed into or received from the water.
(b) Tools must not be supplied with power from the dive location until requested by the diver.
(c) Divers must receive detailed instructions and training in the operation, use and hazards of any underwater power tool prior to the operation.
(d) Underwater power tools have the potential of generating high noise levels so care must be taken to protect the scientific diver from this hazard.
(e) Battery powered tools, esp. those equipped with lithium ion batteries, shall follow the manufacturer's recommended charging procedures along with thorough inspection prior to and after the dive operation to ensure the integrity of the battery has been maintained.

7.3.7 Line Reels and Spools

See 12.0 Glossary for definition. Pertinent safety considerations:

(a) The line should be constructed of neutrally buoyant braided nylon so as to minimize the risk of the line causing any buoyancy challenges for the diver and becoming unweaved while deployed and/or not underload.
(b) Reels should be inspected and functionally tested regularly to ensure the line can be deployed and retrieved without significant effort or interruption, esp. when being used as an aid in surfacing.
(c) When using a reel or spool for surfacing a marker, ensure the reel/spool is configured with sufficient length of line to reach the surface from deployment depth.

7.3.8 Surface Marker Buoys (SMB)

See 12.0 Glossary for definition. Pertinent safety considerations:

(a) Must be equipped with a reel/spool (1) containing sufficient line length to ensure effective surfacing of the buoy from the planned deployment depth and (2) have a mechanism to lock the reel/spool to ensure the line cannot deploy unexpectedly.
    (1) Line should be of braided composition as twisted line can become problematic and unravel during standard use.
(b) Have a means of allowing gas to escape upon ascent, i.e. opened bottom, overpressurization valve.
(c) Be of adequate size to achieve intended visibility in the environment and conditions being deployed.
(d) If used as a lifting device, especially for ascending an item, ensure proper planning of retrieval of load once at the surface.
(e) Methods of gas delivery vary depending on dSMB design, with the most common being oral inflation and pneumatic inflation through a low pressure

hose coming from a volume cylinder. Prior to the operation, each dive team member should be familiar with the means of inflation.

7.3.9 Lift Bags

See 12.0 Glossary for definition. Pertinent safety considerations:

(a) Should be commercially available.
(b) Should be constructed from heavy duty materials that can withstand the stresses of raising objects underwater.
(c) Should have exhaust valves for controlling variable volumes of gas experienced during lifting operations.
(d) Should be constructed with loops, slings, and other attachments in convenient locations for rigging and securing an object.
(e) Select properly sized with appropriate lift capacity based on the object to be lifted, based on buoyancy needs of the object.
(f) Select appropriate rigging materials based on the characteristics of the object, i.e. pre-stretched nylon rope and fastening knots for light loads; nylon straps, wire rope and/or chain with marine hardware for heavier loads.
(g) Divers must be briefed on how to handle a lift that becomes uncontrolled, i.e. rapid ascent and descent.
(h) Depth, water temperature, size of object and size/configuration of the lift bag along with complexity of the operation should all be factors to consider when determining if an independent gas source should be used for the lifting operation.
(i) If divers are controlling the lift while in-water, attention must be paid to the volume of gas in the lift bag to ensure a controlled lift and/or avoid rapid descent due to loss of buoyancy of the object.

7.3.10 Full Face Masks

See 12.0 Glossary for definition. Pertinent safety considerations:

(a) Proper donning and adjusting.
(b) Closing any ambient breathing valves.
(c) Ensuring noseblocks and one-way valves are in place.
(d) Checking seal, oronasal mask, and strap integrity.
(e) Appropriate bail out procedures.
(f) Carrying a spare scuba mask.
(g) Easy retrieval of spare regulator for bail out.
(h) Easy deployment of regulator to out of air diver.
(i) Proper de-watering procedures.
(j) Equalization techniques and procedures.
(k) Readability of gauges and computers.
(l) Gas consumption rates which may be increased with FFM diving.
(m) Gas block utilization/selector valve procedures (if applicable).
(n) Proper through water comms procedures.
(o) Secondary communication protocols in case of loss of primary comms.

7.3.11 Diver Propulsion Vehicles (DPVs)

See 12.0 Glossary for definition. Pertinent safety considerations:

(a) Not be used for ascents and descents.
(b) DPV operation requires greater situational awareness to prevent buddy separation, maintain depth control, monitor breathing gas, and properly navigate.
(c) Proper streamlining and equipment placement to prevent propeller entanglement.
(d) If a DPV fails, floods or becomes unsafe to continue use, be prepared to leave it.

(e) Regulator setup must allow for air sharing with a towed diver.

(f) Observe an air rule that would allow you to swim back, towing DPV if necessary, from the most distant point of the dive.

(g) A diver shall only use those models of DPVs for which the diver has demonstrated proficiency, as described above.

7.4 DIVING EQUIPMENT MAINTENANCE, SERVICE, AND RECORD KEEPING

7.4.1 General

All equipment used for diving and support of:

(a) Must be functionally inspected and tested before first use, and at intervals not to exceed 12 months, or per manufacturer recommendations.

(b) Must be serviced according to the manufacturer's recommendations.

(c) Subject to extreme usage under adverse conditions will undergo more frequent testing and maintenance.

(d) Will have equipment logs maintained in a correct and current condition with all:

(1) Equipment having a unique identity and be traceable to the equipment log.

(2) Entries in the log describing the nature of work performed, including dates of modification, repair or test, the name or initials of the individual performing the work or test and their signature, and the serial number of the particular piece of equipment involved.

7.4.2 Oxygen Cleaning and Maintenance

(a) Service Requirements.

(1) Equipment used with oxygen or mixtures containing over 40% by volume oxygen will be designed and maintained for oxygen service.

(2) Components exposed to concentrations >40% oxygen at pressures above 150 psi, will be cleaned, and maintained for oxygen service.

(3) Oxygen systems over 125 psig will have slow-opening shut-off valves.

7.4.3 Cylinders and Valves

(a) SCUBA Cylinders will:

(1) Have a unique identity with results of all tests being recorded in the equipment log.

(2) Cylinders used in diving operations will be maintained in accordance with the provisions of the Pressure Vessel Safety Orders (reference OSHA standards - 29 CFR 1910.101 and 1910.169 through 1910.171).

(3) Cylinders will be hydrostatic tested to one and a half the MAWP, or code requirements, every fifth year in accordance with Department of Transportation (DOT) standards.

(4) Cylinders will have an internal and external visual inspection for corrosion and damage at intervals not to exceed 12 months. An inspection sticker (VIP) will be affixed to the cylinder indicating the date of next VIP requirement.

(b) Valves will:

(1) Be functionally tested at intervals not to exceed 12 months.

7.4.4 Floatation Devices

See 7.3.1 General requirements.

7.4.5 Helmets and Masks

(a) The non-return valve at the attachment point between helmet or mask and main gas supply hose will be tested regularly to ascertain that it closes readily and positively.

(b) The exhaust valve will be tested regularly to be certain it is in working order.

(c) Manufacturer's specifications will be maintained and all modifications that effect safety or performance will be documented.

7.4.6 Hoses

Breathing gas hoses as part of SCUBA configurations must comply with the general requirements outlined in 7.3.1.
Breathing gas hoses, as part of an umbilical assembly will:

(a) Be tested at least every two years.
(b) Be pressure tested using 1.5 times the normal working pressure.
(c) The test pressure will be maintained without loss of pressure for ten minutes.

7.4.7 Regulators

See 7.3.1 General requirements.

7.4.8 Timing Devices, Pressure and Depth Gauges

See 7.3.1 General requirements. Additionally, each depth gauge as part of a pneumofathometer assembly will:

(a) Be deadweight tested or calibrated against a master reference gauge:
  (1) Every six months, or
  (2) When there is a discrepancy >2% of full scale between any two equivalent gauges.
(b) Be marked with a label, tag, or sticker, indicating:
  (1) The date of the last calibration and due date that does not obstruct full-scale visibility.
  (2) The amount of deviation (+/-) to the calibration standard.

7.4.9 Emergency Equipment

(a) First Aid Kit
  (1) It is recommended that a list of contents be included with a form for recurring inventory. Re-supply contents after use to ensure effective and timely first aid.
(b) Emergency Oxygen Supply and Delivery System
  (1) Each kit will have cylinders with a unique identity with results of all tests being recorded in the equipment log.
  (2) Cylinders will meet the criteria in paragraph 7.1.2 and 7.3.2.
  (3) All replacement parts, lubricants, and fittings will be compatible with oxygen.
  (4) Will be inspected on a monthly basis for sufficient oxygen cylinder pressure and equipment integrity. When checked out for field use will be checked before every day of diving.

7.5 Fill Station Components

All components of gas fill stations that will contact gas mixtures containing >40% oxygen will be cleaned and maintained for oxygen service. This includes cylinders, whips, gauges, valves, and connecting lines.

7.6 Compressor Systems

(a) TAMU-CC Controlled
  (1) Requirements
    (i) Have necessary instrumentation to facilitate operations.
    (ii) Have suitable protection around rotating machinery that meets OSHA standard for rotating machinery (29 CFR 1910.219).
    (iii) Be of proper type, pressure, flow rate, and suitable for service intended.
    (iv) Have piping in accordance to ANSI code B31.I.
    (v) Have flexible hoses in accordance to Section 7.1.7 of this standard.
    (vi) Have electrical controls, wiring, and drive units meeting the jurisdictional requirements, when so equipped.

(vii) Air compressor intakes will be located away from areas containing exhaust gases, fumes, smoke, or other contaminants.

(viii) Low-pressure compressors used to supply air to the diver if equipped with a volume tank will have a check valve on the inlet side, a pressure gauge, a relief valve, and a drain valve.

(ix) Compressed air systems >500 psi will have slow-open/close valves.

(2) Testing and Record Keeping

(i) All equipment will have a unique identity incorporating their manufacturer, model, serial number, maximum rated outlet pressure, rated flow capacity, and safety valve settings.

(ii) Each modification, repair, test, calibration, and/or maintenance service will be logged, including the date and nature of work performed, and the name of the person performing the work for the following equipment:

- Compressors.
- Air storage systems.
- Air filtration systems.
- Analytical instruments.
- Gas control panels.

(iii) A log will be maintained showing operation, repair, overhaul, filter maintenance, temperature adjustment, and results of all gas analyses, for all university-controlled breathing air compressor apparatus. The results of these tests will be entered in a formal log and maintained in a manner suitable to document their results and accomplishment.

(iv) Gas analyses

- Compressors placed in service for an air system will have output tested at regular intervals, not to exceed 100 hours or six months, whichever comes first. Results of these tests must be placed in a formal log.
- Oil-lubricated compressors placed in service for a mixed-gas system will be checked for oil and hydrocarbon contamination at least quarterly.

(v) All equipment will be functionally tested and maintained prior to being put into service, and periodically thereafter in accordance with manufacturers recommendations and planned maintenance schedule.

(b) Commercially Operated

(3) Requirements

(i) Breathing air from commercial sources approved by the DCB will be certified by the supplier as suitable for breathing, according to specifications in Section 7.6 or it will be tested before use by university personnel. A vendor's certification or, a copy of the vendor's verification of the gas producer's certification, is required for use of any special gas mix. A copy for each lot will be filed with the DSO.

7.7 GAS QUALITY STANDARDS

Breathing air standards will conform to CGA Grade E as set forth by the Compressed Gas Association (ANSI CGA Pamphlet G-7.1-1989) and will contain:

Component	Maximum
Oxygen	20-22%/v
Carbon Monoxide	≤10 PPM/v
Carbon Dioxide	≤1000 PPM/v
Condensed Hydrocarbons	≤5 mg/m^3
Total Hydrocarbons as Methane	≤25 PPM/v
Hydrocarbon Contaminants*	**≤0.1 mg/m^3**
Water Vapor (oil lubrication systems only)	2 PPM
Objectionable Odors	none

* Will be met for breathing air that is; placed in contact with oxygen concentrations > 40%, or when used to produce gas by partial pressures with gas mixtures containing > 40% oxygen as the enriching agent.

For breathing air used in conjunction with self-contained breathing apparatus in extreme cold where moisture can condense and freeze, causing the breathing apparatus to malfunction, a dew point not to exceed -50°F (63 pm v/v) or 10 degrees lower than the coldest temperature expected in the area is required.

For remote site operations using gas sources not controlled by the OM, every effort should be made to verify breathing gas meets the requirements of this standard. If CGA Grade E gas is not verifiable, the DCB must develop a protocol to mitigate risk to the diver.

Section 8.0

Medical Standards

8.0 MEDICAL STANDARDS

8.1 MEDICAL EXAMINATION CRITERIA

(a) TAMU-CC will determine that all divers have passed a current dive physical examination and have been declared by the examining physician to be fit to engage in diving activities as may be limited or restricted in the medical evaluation report.

(b) All medical evaluations will be performed by, or under the direction of, a licensed physician. The physician will be qualified by experience or training for the conduct of diving physical examinations and if not, will consult with another medical practitioner so qualified. The examining and/or supervising physician must hold at least a doctor of medicine (MD) or nurse practitioner (NP/NPR) certification, evaluations and signatures from physician's assistants (PA) will not be accepted.

(c) The diver applicant will agree to release the medical information to the DSO and the DCB (Appendix 8.B).

(d) The diver will be free of any chronic disabling disease and conditions contained in the list of conditions for which restrictions from diving are generally recommended (Section 8.3.2 and Appendix 8.A).

8.2 MEDICAL EXAMINATION FREQUENCY

Medical evaluations will be completed as follows:

(a) An initial medical examination is required before a diver may begin any in-water activities. A complete initial medical examination will not be required if all of the following criteria are met:

(1) An equivalent medical evaluation has been obtained within the terms outlined below.

(2) No disqualifying conditions subject to this section were found.

(3) TAMU-CC has the medical approval of that examination for the diver's file.

(4) The approval has been found satisfactory by the TAMU-CC DCB.

(b) Periodic examinations are as follows:

(1) Scientific Divers-in-Training, Scientific Divers, and Temporary Divers

(i) Less than 40 years of age at five year intervals

(ii) 40 years of age and less than 60 at three year intervals

(iii) 60 years of age and greater at two year intervals

(2) Working Divers

(i) Less than 35 years of age at one year intervals, a maximum of two years is acceptable.

(ii) 35 years of age and greater at one year intervals

(c) Clearance to return to diving will be obtained from a physician following any major injury or illness, or any condition requiring hospital care. If the illness or injury is pressure related, then the clearance to return to diving will come from a physician trained in hyperbaric medicine.

8.3 CONTENT OF MEDICAL EVALUATION

8.3.1 Content of Medical Evaluations

Both Initial and periodic Medical Evaluations must consist of:

(a) Diving Medical Exam Overview for the Examining Physician (Appendix 8.A).

(b) Medical Evaluation Report of Fitness for Diving and Applicant's Release of Medical Information Form (Appendix 8.B).

(c) Diving Medical History Form (Appendix 8.C).

(d) Recommended Physicians with Diving Expertise (Appendix 8.D).

8.3.2 Disqualifying Conditions

Conditions that may disqualify a candidate from diving (adapted from Bove, 1998):

(a) Abnormalities of the tympanic membrane, such as perforation, presence of monomeric membrane, or inability to auto-inflate the middle ears.

(b) Vertigo including Meniere's disease.
(c) Stapendectomy and middle ear prosthesis.
(d) Recent ocular surgery.
(e) Psychiatric disorders including, claustrophobia, suicidal ideation, psychosis, anxiety states depression.
(f) Substance abuse, including alcohol.
(g) Episodic loss of consciousness.
(h) History of seizure.
(i) History of stroke or neurological deficit.
(j) Recurring neurological disorders, including transient ischemic attack.
(k) History of intracranial aneurysm, other vascular malformation, or intracranial hemorrhage.
(l) History of neurological decompression sickness with residual deficit.
(m) Head injury with sequelae.
(n) Hematological disorders including coagulopathies.
(o) Evidence of coronary artery disease or high risk for coronary artery disease.
(p) Arterial septal defects.
(q) Significant valvular heart disease – isolated mitral valve prolapse is not disqualifying.
(r) Significant cardiac rhythm or conduction abnormalities.
(s) Implanted cardiac pacemakers and cardiac defibrillators.
(t) Inadequate exercise tolerance.
(u) Severe hypertension.
(v) History of spontaneous or traumatic pneumothorax.
(w) Asthma.
(x) Chronic pulmonary disease, including radiographic evidence of pulmonary blebs, bullae, or cysts.
(y) Diabetes mellitus.
(z) Pregnancy.

8.4 MEDICAL TESTS FOR DIVING

Laboratory and Interval Requirements for Diving Medical Exams are as follows:

Laboratory Requirements For Evaluations and Intervals	Scientific Divers			Working Divers	
Age	<40	40 - 60	>60	<35	≥35
Frequency	5 yrs.	3 yrs.	2 yrs.	2 yrs.	1 yr.
Medical History	X	X	X	X	X
Physical, emphasis on neurological/otological components.	X	X	X	X	X
Urinalysis	X	X	X	X	X
Any further tests deemed necessary by the physician.	X	X	X	X	X
Chest X-ray (not required for Scientific Diver Re-examinations, only Working)		X	X	X	X
EKG: standard (12 Leads)		X	X	X	X
Coronary Assessment using Multi-Risk Factor Assessment[1, 2] (age, lipid, blood pressure, diabetic screening, smoker).		X	X	X	X
Spirometry				X	X
Audiogram				X	X
Visual Acuity and Color Blindness				X	X
Complete Blood Count (CBC) and Chemistry Will include Hematocrit, Hemoglobin, & White Blood Cell count.				X	X

[1] Grundy, R. J. et al. 1999. Assessment of Cardiovascular Risk by Use of Multiple Risk-Factor Assessment Equations". AHA/ACC Scientific Statement.

[2] Bove, A. A. 2011. The cardiovascular system and diving risk. Undersea and Hyperbaric Medicine. 38(4): 261-269.

8.5 PHYSICIANS REPORTS

(a) TAMU-CC will provide a copy of the medical evaluation requirements of this standard to the examining physician (Appendix 8.A-B).

(b) After any medical examination relating to the individual's fitness to dive, the examining or supervising physician will provide TAMU-CC with a written report containing their opinion of the fitness of the individual to dive, including any recommended restrictions or limitations. The examining and/or supervising physician must hold at least a doctor of medicine (MD) or nurse practitioner (NP/NPR) certification, evaluations and signatures from physician's assistants (PA) will not be accepted. The DCB and/or DSO will review the completed medical examination information.

(c) A copy of the physicians report will be available to the individual.

(d) It is the diver's responsibility to provide to the OM a written statement from the examining or supervising medical authority listing any restrictions, limitations, or clearances to dive resulting from medical examinations obtained by the individual outside of their normal diving medical examination cycle. These statements will be reviewed by the DCB or designee and the diver's record and authorizations will be updated accordingly.

8.6 MEDICAL RECORDS

An accurate medical record for each person subject to the specifications of this section will be maintained. The records will include, at the minimum, a copy of the written report by the physician (Appendix 8.B), and will be kept for five years per OSHA CFR 1910.440(b)(3)(i).

APPENDIX 8.A

DIVING MEDICAL EVALUATION OVERVIEW FOR THE PHYSICIAN

TO THE EXAMINING PHYSICIAN:

_____, requires a medical examination to assess fitness for diver status with Texas A&M University - Corpus Christi's diving program.

Applicant is applying for: _____ Scientific Diving _____ Working Diving

This examination is: _____ Initial exam _____ Re-examination

Their answers on the Diving Medical History Form (Attachment 2) may indicate potential health or safety risks as noted. Your evaluation is requested on the attached Diving Fitness Medical Evaluation Report. If you have questions of a general nature about diving medicine, you may wish to consult one of the references on the attached list or contact one of the physicians with expertise in diving medicine whose names and phone numbers appear on the attachment as well (Attachment 3). Please contact the undersigned Diving Safety Officer if you have any questions or concerns about the Texas A&M University - Corpus Christi dive program or the diving medical standards. Thank you for your assistance.

Diving Safety Officer: _____ (Print name) _____ (Date)

_____ (Signature) _____ (Telephone)

Scuba and other modes of compressed gas diving can be strenuous and hazardous. A special risk is presented if the middle ear, sinuses, or lung segments do not readily equalize pressure changes. The most common cause of distress is Eustachian insufficiency. Most fatalities involve deficiencies in prudence, judgment, emotional stability, or physical fitness. Please consult the following list of conditions that usually restrict candidates from diving (Adapted from Bove, 1998: bracketed numbers are pages in Bove):

Abnormalities of the tympanic membrane, such as perforation, presence of monomeric membrane, or inability to auto-inflate the middle ears. [5,7,8,9]
Vertigo including Meniere's disease. [13]
Stapedectomy and middle ear prosthesis. [11]
Recent ocular surgery. [15,18,19]
Psychiatric disorders including, claustrophobia, suicidal ideation, psychosis, anxiety states depression. [20-23]
Substance abuse, including alcohol. [24-25]
Episodic loss of consciousness. [1, 26, 27]
History of seizure. [27-28]
History of stroke or neurological deficit. [29-30]
Recurring neurologic disorders, including transient ischemic attack. [29-30]
History of intracranial aneurysm, other vascular malformation, or intracranial hemorrhage. [31]
History of neurological decompression sickness with residual deficit. 29-30]
Head injury with sequelae. [26-27]
Hematological disorders including coagulopathies. [41-42]
Evidence of coronary artery disease or high risk for coronary artery disease. [33-35]
Arterial septal defects. [39]
Significant valvular heart disease – isolated mitral valve prolapse is not disqualifying. [38]
Significant cardiac rhythm or conduction abnormalities. [36-37]
Implanted cardiac pacemakers and cardiac defibrillators (ICD). [39-40]
Inadequate exercise tolerance. [34]
Severe hypertension. [35]
History of spontaneous or traumatic pneumothorax. [45]
Asthma. [42-44]
Chronic pulmonary disease, including radiographic evidence of pulmonary blebs, bullae, or cysts. [45-46]
Diabetes mellitus. [46-47]
Pregnancy. [56]

SELECTED REFERENCES IN DIVING MEDICINE

Available from Best Publishing Company, P.O. Box 30100, Flagstaff, AZ 86003-0100, the Divers Alert Network (DAN) or the Undersea and Hyperbaric Medical Society (UHMS), Durham, NC

Elliott, D.H. ed. 1996. Are Asthmatics Fit to Dive? Kensington, MD: Undersea and Hyperbaric Medical Society.

Bove, A. A. 2011. The cardiovascular system and diving risk. Undersea and Hyperbaric Medicine 38(4): 261-269.

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Douglas, P.S. 2011. Cardiovascular screening in asymptomatic adults: Lessons for the diving world. Undersea and Hyperbaric Medicine 38(4): 279-287.

Mitchell, S. J., and A. A. Bove. 2011. Medical screening of recreational divers for cardiovascular disease: Consensus discussion at the Divers Alert Network Fatality Workshop. Undersea and Hyperbaric Medicine 38(4): 289-296.

Grundy, S. M, Pasternak, R., Greenland, P., Smith, S., and Fuster, V. 1999. Assessment of Cardiovascular Risk by Use of Multiple Risk-Factor Assessment Equations. AHA/ACC Scientific Statement. Journal of the American College of Cardiology, 34: 1348-1359. http://content.onlinejacc.org/cgi/content/short/34/4/1348

Bove, A. A. and Davis, J. 2003. DIVING MEDICINE, Fourth Edition. Philadelphia: W.B. Saunders Company.

Edmonds, C., Lowry, C., Pennefather, J. and Walker, R. 2002. DIVING AND SUBAQUATIC MEDICINE, Fourth Edition. London: Hodder Arnold Publishers.

Bove, A. A. ed. 1998. MEDICAL EXAMINATION OF SPORT SCUBA DIVERS, San Antonio, TX: Medical Seminars, Inc.

NOAA DIVING MANUAL, NOAA. Superintendent of Documents. Washington, DC: U.S. Government Printing Office.

U.S. NAVY DIVING MANUAL. Superintendent of Documents, Washington, DC: U.S. Government Printing Office, Washington, D.C.

APPENDIX 8.B

MEDICAL EVALUATION REPORT OF FITNESS FOR DIVING

_____ Name of Applicant (Print/Type)

_____ Date (Day/Month/Year)

TO THE EXAMINING OR SUPERVISING PHYSICIAN:
This person is an applicant for training or is presently certified to engage in diving with self-contained underwater breathing apparatus (scuba). This activity puts unusual stress on the individual in several ways. Your opinion of the applicant's medical fitness is requested. Scuba diving requires heavy exertion. The diver will be free of cardiovascular and respiratory disease. An absolute requirement is the ability of the lungs, middle ear, and sinuses to equalize pressure. Any condition that risks the loss of consciousness will disqualify the applicant.

NOTE: Evaluating physicians MUST be a MD/DO or NP/NPR, evaluations or signatures by PAs will not be accepted.

TESTS:
Please initial that the following tests were completed.
All Initial and Periodic Re-examination tests are to be completed in their entirety. If they fall between the Initial and Periodic Re-examinations the extent of tests and lab requirements are to be at the discretion of the examining physician and are to be at a level equal to that of basic annual health maintenance physical.
Please check tests performed.

	Laboratory Requirements For Evaluations and Intervals	Scientific Divers			Working Divers	
_____	Age	<40	40 - 60	>60	<35	≥35
_____	Frequency	5 yrs.	3 yrs.	2 yrs.	2 yrs.	1 yr.
_____	Medical History	X	X	X	X	X
_____	Physical, emphasis on neurological/otological components.	X	X	X	X	X
_____	Urinalysis	X	X	X	X	X
_____	Any further tests deemed necessary by the physician.	X	X	X	X	X
_____	Chest X-ray (NOTE: not required for Scientific Diver Re-examinations, only Working Divers)		X	X	X	X
_____	EKG: standard (12 Leads)		X	X	X	X
_____	Coronary Assessment using Multi-Risk Factor Assessment [1, 2] (age, lipid, blood pressure, diabetic screening, smoker).		X	X	X	X
_____	Spirometry				X	X
_____	Audiogram				X	X
_____	Visual Acuity and Color Blindness				X	X
_____	Complete Blood Count (CBC) and Chemistry Will include Hematocrit, Hemoglobin, & White Blood Cell count.				X	X

[1] Grundy, R. J. et al. 1999. Assessment of Cardiovascular Risk by Use of Multiple Risk-Factor Assessment Equations". AHA/ACC Scientific Statement.
[2] Bove, A. A. 2011. The cardiovascular system and diving risk. Undersea and Hyperbaric Medicine. 38(4): 261-269

PHYSICIANS STATEMENT:

_____ Diver **IS** medically qualified to dive on: _____ Scientific status for: _____ 2 years (over age 60)
_____ 3 years (age 40-59)
_____ 5 years (under age 40)
_____ Working status for: _____ 2 years (under age 35)
_____ 1 year (over age 35)

_____ Diver **IS NOT** medically qualified to dive: _____ Permanently _____ Temporarily

REMARKS:

_____
_____
_____
_____
_____

I have evaluated the abovementioned individual according to the American Academy of Underwater Sciences medical standards and required tests for scientific diving (Sec. 6.00 and Appendix 1) and, in my opinion, find no medical conditions that may be disqualifying for participation in scuba diving. I have discussed with the patient any medical condition(s) that would not disqualify them from diving but which may seriously compromise subsequent health. The patient understands the nature of the hazards and the risks involved in diving with these conditions. **NOTE: Evaluating physicians MUST be a MD/DO or NP/NPR, evaluations or signatures by PAs will not be accepted.**

_____
Signature

_____ _____
Name (Print/Type) Title (MD/DO, NP/NPR)

_____
Address

_____ _____
Telephone Number Date (month/day/year)

My familiarity with applicant is: _____ This exam only ____ Regular physician _____ Number of years.
Other (describe): _____
_____

My familiarity with diving medicine is: _____
_____
_____

APPLICANT'S RELEASE OF MEDICAL INFORMATION FORM

_____
Name of Applicant (print or type)

I authorize the release of this information and all medical information subsequently acquired in association with my diving to Texas A&M University - Corpus Christi's Diving Safety Officer and Diving Control Board, or designee.

_____ _____
Signature of Applicant Date (Day/Month/Year)

APPENDIX 8.C

DIVING MEDICAL HISTORY FORM

(TO BE COMPLETED BY APPLICANT-DIVER)

Name _____ Sex _____ Age _____ Wt. _____ Ht. _____

Sponsor _____ Date _____
(Facility, etc.) (Day/Month/Year)

TO THE APPLICANT
Diving makes considerable demands on your physical and emotional condition. Diving with certain medical conditions may be asking for trouble, not only for yourself but also for anyone coming to your aid if you get into difficulty in the water. Therefore, it is prudent to meet certain medical and physical requirements before beginning a diving or training program.
Your answers to the questions are as important, in many instances, in determining your fitness as what the physician may see, hear, or feel when you are examined. Obviously, you will give accurate information or the medical screening procedure becomes useless.
This form will be kept confidential. If you believe any question(s) amounts to invasion of your privacy, you may elect to omit an answer, provided you discuss the matter with the physician; and they will then indicate, in writing, that you have done so and that no health hazard exists.
If your answers indicate a condition(s) that might make diving hazardous, you will be asked to review the matter with your physician. In such instances, their written authorization will be required in order for further consideration to be given your application. If your physician concludes that diving would involve undue risk for you, remember that they are concerned only with your well-being and safety. Respect this advice and the intent of this medical history form.

	Yes	No	Please indicate whether or not the following apply to you	Comments
1			Convulsions, seizures, or epilepsy	
2			Fainting spells or dizziness	
3			Been addicted to drugs	
4			Diabetes	
5			Motion sickness or sea/air sickness	
6			Claustrophobia	
7			Mental disorder or nervous breakdown	
8			Are you pregnant?	
9			Do you suffer from menstrual problems?	
10			Anxiety spells or hyperventilation	
11			Frequent sour stomach, nervous stomach, or vomiting spells	
12			Had a major operation	
13			Presently being treated by a physician	

	Yes	No	Please indicate whether or not the following apply to you	Comments
14			Taking any medication regularly (even non-prescription)	
15			Been rejected or restricted from sports	
16			Headaches (frequent and severe)	
17			Wear dental plates	
18			Wear glasses or contact lenses	
19			Bleeding disorders	
20			Alcoholism	
21			Any problems related to diving	
22			Nervous tension or emotional problems	
23			Take tranquilizers	
24			Perforated ear drums	
25			Hay fever	
26			Frequent sinus trouble, drainage from the nose, post-nasal drip, or stuffy nose	
27			Frequent earaches	
28			Drainage from the ears	
29			Difficulty with your ears in airplanes or on mountains	
30			Ear surgery	
31			Ringing in your ears	
32			Frequent dizzy spells	
33			Hearing problems	
34			Trouble equalizing pressure in your ears	
35			Asthma	
36			Wheezing attacks	
37			Cough (chronic or recurrent)	
38			Frequently raise sputum	
39			Pleurisy	
40			Collapsed lung (pneumothorax)	
41			Lung cysts	

	Yes	No	Please indicate whether or not the following apply to you	Comments
42			Pneumonia	
43			Tuberculosis	
44			Shortness of breath	
45			Lung problem or abnormality	
46			Spit blood	
47			Breathing difficulty after eating particular foods, after exposure to particular pollens or animals	
48			Are you subject to bronchitis	
49			Subcutaneous emphysema (air under the skin)	
50			Air embolism after diving	
51			Decompression sickness	
52			Rheumatic fever	
53			Scarlet fever	
54			Heart murmur	
55			Large heart	
56			High blood pressure	
57			Angina (heart pains or pressure in the chest)	
58			Heart attack	
59			Stroke	
60			Low blood pressure	
61			Recurrent or persistent swelling of the legs	
62			Pounding, rapid heartbeat or palpitations	
63			Easily fatigued or short of breath	
64			Abnormal EKG	
65			Joint problems, dislocations or arthritis	
66			Back trouble or back injuries	
67			Ruptured or slipped disk	
68			Limiting physical handicaps	
69			Muscle cramps	

	Yes	No	Please indicate whether or not the following apply to you	Comments
70			Varicose veins	
71			Amputations	
72			Head injury causing unconsciousness	
73			Paralysis	
74			Have you ever had an adverse reaction to medication?	
75			Do you smoke?	
76			Have you ever had other medical problems not listed? If so, please list or describe below;	
77			Is there a family history of high cholesterol?	
78			Is there a family history of heart disease or stroke?	
79			Is there a family history of diabetes?	
80			Is there a family history of asthma?	
81			Date of last tetanus shot? Vaccination dates?	

Please explain “yes” to any of the above questions.

I certify that the above answers and information represent an accurate and complete description of my medical history.

Applicants Name (Print/Type)

Signature of Applicant (Print/Type)

Date (Day/Month/Year)

APPENDIX 8.D

RECOMMENDED PHYSICIANS WITH DIVING MEDICINE EXPERTISE

Divers Alert Network
Duke University Medical Center
P.O. Box 3823
Durham, North Carolina 27710
OFFICE: 919-684-2948

Section 9.0

Emergency Procedures

9.0 EMERGENCY PROCEDURES

9.1 DIVER TREATMENT PROCEDURES

The following treatment procedures are minimum guidelines, as outlined by the organizational standards referenced in Section 1.2.2 and 1.2.3, to assist with the first aid and treatment of a diver with an injury. The following are in no order of preference as each emergency will dictate its own priorities. Modifications may be necessary for each diving application.
NOTE: Refer to the Dive Plan of the particular dive operation for emergency contact listings (Appendix 4.B). For medical consultation information, refer to the Advisors to the TAMU-CC DCB in pretext or Diving Physicians list, Appendix 8.D.

(a) Minor Injuries – can be treated by qualified university personnel without the assistance of non-university medical professionals.

(1) Administer first aid treatment as necessary.

(i) Notify appropriate TAMU-CC personnel so incident reports may be filed accordingly (Section 10.0).

(b) Major Injuries – require assistance from non-university medical professionals may be separated into three categories:

(1) Pressure Related Accidents - require recompression (pressure related accidents, e.g. air-embolism or bends).

(i) Establish (C)irculation, (A)irway, and (B)reathing – supplement with oxygen.
(ii) Continue oxygen administration.
(iii) Activate EMS or contact Coast Guard (VHF Channel 16 or telephone Regional Rescue Coordination Center, New Orleans (504) 589-6225) and arrange to have the victim and person administering the first aid treatment picked up and transported to the nearest hyperbaric facility.
(iv) If Coast Guard cannot provide transportation, request a call to 911(EMS) be made to have an ambulance waiting at nearest dock site.
(v) Perform secondary assessment; administer first aid as needed.
(vi) Monitor until EMS arrives or victim is evacuated.
(vii) Lead Diver or DPIC files accident report.
(viii) Information needed by chamber personnel when requesting assistance:

- Victim conscious or unconscious?
- Do symptoms indicate air embolism or decompression sickness (bends)?
- Victim arriving by automobile, ambulance, or helicopter? If automobile, give make, model, and license plate number.
- Victim's full name, age, sex, social security number, dive profile and estimated time of arrival.
- Give your name and victim's emergency contact information.

(2) Injuries and Severe Wounds – require first aid and immediate transportation of the injured person to a hospital.

(i) Establish (C)irculation, (A)irway, and (B)reathing – supplement with oxygen.
(ii) Perform Secondary Assessment and administer first aid. Continue oxygen administration as needed.
(iii) Contact EMS or contact Coast Guard (VHF Channel 16 or telephone Regional Rescue Coordination Center, New Orleans (504) 589-6225 and arrange for transportation to hospital.

(iv) Continue first aid and treat for shock. Monitor until EMS arrives or victim is evacuated.
(v) Lead Diver or DPIC files accident report.

(3) Near Drowning - requires immediate first aid and summoning of medical personnel to the injured person (near-drowning or suspected cervical spinal damage).

(i) Establish (C)irculation, (A)irway, and (B)reathing—supplement with oxygen.
(ii) Contact EMS or radio Coast Guard and arrange for transportation to hospital.
(iii) If Coast Guard is unable to provide transportation, request that a call to 911(EMS) be made to have an ambulance waiting at the nearest dock site.
(iv) Continue application of artificial respiration and CPR supplemented with oxygen until relieved by professional medical personnel.
(v) In case of suspected cervical spinal injury, stabilize victim using accepted treatment procedures and transport with as little movement as possible to a point where pre-summoned EMS personnel can treat and transport victim to the Emergency Room.
(vi) Lead Diver or DPIC files accident report.

9.2 DIVE OPERATION PROCEDURES

The following emergency procedures are minimum guidelines to assist with the development of specific Dive Plans. The following are in no order of preference as each emergency will dictate its own priorities. Modifications may be necessary for each diving application.
With any dive emergency, immediately abort ALL TAMU-CC dive operations and bring divers to the surface immediately and within the confines of a safe ascent. Diving will not resume until the cause has been fully remedied.

(a) Loss of Breathing Media

(1) Re-establish media supply by:

(i) Activating topside secondary breathing supply, or
(ii) Diver switches to their RGS.

(2) Alert Standby Diver.
(3) Diver proceeds to down-line.
(4) If required, send Standby Diver to diver's assistance.
(5) Terminate dive.

(b) Loss of Communications

(1) Attempt to establish line-pull signals.
(2) Alert Standby Diver.
(3) Diver proceeds to down-line.
(4) Bring diver to first stop once line-pull signals are established.
(5) If unable to establish any form of communication with diver, send Standby Diver to diver's assistance prior to bringing to diver's first stop.
(6) Terminate dive.

(c) Fouled or Entrapped Diver

(1) Diver informs topside.
(2) Have the diver avoid panic and ensure s/he do not begin ditching equipment.
(3) Alert Standby Diver.
(4) Diver determines extent of entrapment.
(5) Diver attempts to free himself.
(6) If required, send Standby Diver to diver's assistance.

(7) When diver is free, if unable or unwilling to continue the dive, or if Standby Diver was required to enter water for assistance, terminate dive.

(d) Injured Diver in Water

(1) Diver informs topside and dive is aborted.
(2) Alert Standby Diver.
(3) Diver determines nature and extent of injury.
(4) If required, send in Standby Diver down to assist diver, administer first aid, and evaluate injury. Standby Diver will remain with diver.
(5) Request medical assistance and emergency evacuation (if required).
(6) Monitor breathing. If breathing stops, overpressure divers regulator if possible.

(e) Severance of Diver's Umbilical–Gas Hose Only

(1) Diver activates reserve-breathing supply.
(2) Alert Standby Diver.
(3) Diver returns to down-line.
(4) Terminate dive and follow proper ascent procedures.
(5) If required send Standby Diver down with additional reserve breathing supply or hose.

(f) Severance of Diver's Umbilical–Complete

(1) Diver activates reserve-breathing supply.
(2) Alert Standby Diver.
(3) Diver return to down-line.
(4) If umbilical severed on deck and the end of the umbilical is still on deck, send Standby Diver down umbilical with new hose or reserve breathing gas supply. Otherwise, send Standby Diver down down-line.
(5) Terminate dive and begin proper ascent procedures.

(g) Fire in Equipment

(1) Extinguish fire; secure equipment.
(2) Determine damage and effect on diver.
(3) If required, terminate dive; commence proper ascent procedures.

(h) Equipment Failure – Diver in Water

(1) Evaluate effect on diver.
(2) Inform diver of problem and action planned.
(3) Alert Standby Diver.
(4) Alert deck crew.
(5) Diver informs topside of their readiness.
(6) Active plan, terminate dive.

(i) Oxygen Toxicity

(1) Lead Diver or DPIC notes signs or diver reports symptoms to topside.
(2) Dive is aborted.
(3) Reduce diver's oxygen partial pressure (e.g. switch to air or lower PPO2 gas.)
(4) Continue proper ascent procedures.

(j) Oxygen Toxicity During Treatment/Stop

(1) Diver reports to topside.
(2) Have diver reduce O2 partial pressure (switch to air) for 15 minutes. When symptoms disappear, continue ascent on previous gas mixture. Do not count time on the lower PPO2 gas.
(3) If toxicity symptoms occur a second time, repeat PPO2 reduction of 15 minutes.

(4) If toxicity symptoms occur a third time, discontinue oxygen treatment and immediately request advice and assistance from designated point of contact.

(k) Emergency Evacuation

(1) Notify Diver and all surrounding personnel of emergency and terminate dive.

(2) Have diver begin ascent following proper procedure. If not possible, follow omitted decompression procedures.

(3) Evacuate all unnecessary personnel to safe platform.

(4) Contact management and inform them of conditions as soon as possible.

Section 10.0

Accident Reporting

10.0 INCIDENT REPORTS

All TAMU-CC diving illnesses and accidents will be recorded specifying the circumstances of the incident and the extent of the injuries or illness. All diving illnesses and accidents will be reported to the DCB. TAMU-CC will report all illnesses and accidents in accordance with requirements of the appropriate Labor Code and Organizations of which TAMU-CC is a member, e.g.46 CFR – Department of Transportation – Coast Guard, 29 CFR – Department of Labor – Occupational Safety and Health Administration, and Standards for Scientific Diving – American Academy of Underwater Sciences.

10.1 SPECIFIC REPORTING REQUIREMENTS

10.1.1 46 CFR – Department of Transportation – Coast Guard

Subchapter V-Marine Occupational Safety and Health Standards, Part § 197.484, requires the Lead Diver or DPIC to notify the Officer in Charge, Marine Inspection, as soon as possible after a diving casualty occurs, if the casualty involves any of the following:

(a) Loss of Life.
(b) Diving-related injury to any person causing incapacitation for more than 72 hours.
(c) Diving-related injury to any person requiring hospitalization for more than 24 hours.

Part § 197.486 define the form of the written report of casualty and require:

(a) That a report be furnished on Form CG-2692 when the diving installation is on a vessel or,
(b) That a written report, in narrative form, be used when the diving installation is on a facility.

In either instance, the report will furnish the following information:

(a) Name and official number (if applicable) of the vessel or facility.
(b) Name and owner agent of the vessel of facility.
(c) Name of the Lead Diver or DPIC.
(d) Description of the casualty including presumed cause.
(e) Nature and extent of the injury to persons.

10.1.2 29 CFR – Department of Labor – OSHA

Subpart T – Commercial Diving Operations, § 1910.440, requires the employer record the occurrence of any diving-related injury or illness which requires any dive team member to be hospitalized for 24 hours or more, specifying the circumstances of the incident and the extent of any injuries or illness.
In May 1994, OSHA further clarified and defined the reporting requirements to state: Employers are required to orally report any occupational fatality or catastrophe involving in-patient hospitalization of three or more workers within eight hours per 29 CFR § 1910.8. The report will include the following information:

(a) Company Name.
(b) Location and time of incident.
(c) Number of fatalities or hospitalized employees.
(d) Contact person for the company.
(e) Phone number(s) for the company contact person.
(f) Brief description of the incident.

10.1.3 Standard for Scientific Diving – AAUS

Per AAUS, all diving related incidents requiring recompression treatment, or resulting in moderate to serious injury, or death will be reported. The report will specify the circumstances of the incident and the extent of any injuries or illnesses.
If the incident was pressure-related, suspected, or if any symptoms are evident, the TAMU-CC Incident Report will also contain the following additional information and be retained by TAMU-CC, with the record of the dive as outlined in Section 6.6:

(a) Written descriptive report containing:
   (1) Name, address, and phone number(s) of principal parties involved.
   (2) Summary of experience of the divers involved.
   (3) Location and description of the dive site, and conditions leading to the incident.
   (4) The circumstances of the incident and the extent of any injuries or illnesses.
   (5) Description of symptoms, including depths and time of onset.
   (6) Description and results of treatment.
   (7) Disposition of case.
   (8) Recommendations to avoid repetition of incident.

(b) A decompression procedure assessment in which TAMU-CC's DCB will:
   (1) Investigate and evaluate the pressure related sickness, based on recorded information, consideration of previous pressure related injuries, tables used, and individual susceptibility.
   (2) Take appropriate corrective action to reduce the probability of recurrence of similar pressure related injuries.
   (3) Prepare a written evaluation of the procedure assessment, including any corrective action taken, within 45 days of the incident.
   (4) Forward a copy to AAUS during the annual reporting cycle.

(c) In addition to requirements specific to the OM, all diving incidents will be reported to the AAUS. This report must first be reviewed and released by the OM's DCB and at a minimum contain:
   (1) Complete AAUS Incident Report.
   (2) Summary of experience of divers involved.
   (3) Description of dive site, and description of conditions that led up to incident.
   (4) The circumstances of the incident and the extent of any injuries or illnesses.
   (5) Description of symptoms, including depth and time of onset.
   (6) Description and results of treatment.
   (7) Disposition of case.
   (8) Recommendations to avoid repetition of incident.

(d) It is also recommended that near-misses be reported to the AAUS in a timely manner, utilizing the Near-Miss Reporting Form that can be found on the AAUS website. Near-Misses may be reported by any Scientific Diver. It is recommended that Near-Miss reports be generated by the TAMU-CC DSO and/or DCB. AAUS reserves the right to contact the TAMU-CC DSO/DCB regardless of who reports the near-miss.

APPENDIX 10.A

INCIDENT AND ACCIDENT FORM

Incident Reporting: All diving related incidents requiring recompression treatment, or resulting in moderate or serious injury, or death will be reported to the Texas A&M University - Corpus Christi Diving Control Board. The report will specify the circumstances of the incident and the extent of any injuries or illnesses. This form is confidential and for information purposes only. Texas A&M University - Corpus Christi's Diving Control Board will review and approve the release of this report before it may be submitted to other entities.

VICTIM INFORMATION

Name: _____

Address: _____

Home Phone Number: _____ Work Phone Number: _____

Gender: (M) (F) Marital Status: (S) (M) Height: _____ Weight: _____

Certified Diver: (Y) (N) If yes, what Agency? _____

Level of Dive Certification: _____ Occupation: _____

Date of Incident: _____ Time of Incident: _____

PERSON MAKING REPORT

Name: _____

Address: _____

Home Phone Number: _____ Work Phone Number: _____

Did you witness the incident? (Y) (N) Are you a certified diver? (Y) (N)

Level of Dive Certification: _____ Agency: _____

Relationship to accident victim: _____

LEAD DIVER INFORMATION

Name: _____

Address: _____

Home Phone Number: _____ Work Phone Number: _____

Level of Dive Certification: _____ Agency: _____

Diver Insurance Company: _____

WITNESS INFORMATION

If witness statements are taken, they will provide only facts, no opinions. Have witness date and sign each page of statement. Attach copies to this report.

NAME	ADDRESS	PHONE NUMBER

GENERAL INFORMATION

Type of incident (non-injury, bodily, fatality): _____

Diving activity at the time of incident: _____

Victim was (Scuba diving, snorkeling, other): _____

Describe the location by state, country, and nearest geographic location: _____

Was there any apparent panic by victim? _____

Victim was recovered where (on or below surface, if below provide depth): _____

Length of time from incident to recovery of victim: _____

Who made the rescue/recovery? _____

Was rescue breathing attempted? YES NO Was CPR attempted? YES NO

Was oxygen provided to victim? YES NO If yes, by whom? _____

Were emergency medical services used? YES NO If yes, what agency: _____

Was victim transported to medical facility YES NO If yes, what facility: _____

Did victim receive recompression treatment? YES NO If yes, what facility: _____

Please attach any waivers, releases, or statements of understanding signed by victim. If the accident took place during training or working phase, please attach copies of pertinent records of training. If possible, attach a copy of victim's dive logs.

VICTIM'S EQUIPMENT

Of the following items, provide information as it applies (brand, model, etc.):

Mask: _____

Fins: _____

Snorkel: _____

Regulator: _____

BC Type: _____

Thermal Protection: _____

SPG: _____

Depth Gauge: _____

Back-up Regulator: _____

Weight System: _____ Amount _____

Tank System Mask: _____ Size(s) _____ Type(s) _____

Surface Float type: _____

Underwater Light: YES NO Type _____

Dive Computer: YES NO Type (console, wrist mount) _____

Other Equipment: _____

Were there apparent equipment problems? YES NO If yes, describe: _____

Was equipment rented? YES NO If yes, describe: _____

Amount of air in cylinder: _____

Current location of equipment: _____

Is equipment being tested? YES NO If yes, by whom: _____

DIVING INFORMATION:

Mode of entrance (Shore, Boat, other): _____

Incident occurred (on or below surface, if below provide depth)? _____

Water Conditions (calm, rough): _____ Wave Height _____ Water Temp: _____ Visibility: _____

Victim alone, with buddy? _____ Buddy Contact Broken? _____ Entangled (explain)? _____

Explain: _____

Task/type of dive (deep, current, wreck, boat, night, collection, photography)? _____

Explain: _____

Finally, include a brief narrative description (Attach separate sheet providing only facts and no opinions). Include a list of emergency services or other agencies known to have taken reports etc.

_____ _____

Name (Print/Type) Date of Report (Day/Month/Year)

_____

Signature

Section 11.0

Department of Labor:
Occupational Safety and Health Administration
COMMERCIAL DIVING STANDARD

11.0 CFR 1910 - OCCUPATIONAL SAFETY AND HEALTH STANDARDS

Sub-part T—Commercial Diving Operations

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1910 Subpart T-Commercial Diving Operations

Authority: Sections 4, 6, and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); sec. 107, Contract Work Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333); sec. 41, Longshoreman and Harbor Workers' Compensation Act (33 U.S.C. 941); Secretary of Labor's Order No. 12-71 (36 FR 87540); 8-76 (41 FR 25059); 9-83 (48 FR 35736), or 1-90 (55 FR 9033), as applicable; and 29 CFR part 1911.
Source: 42 FR 37668, July 22, 1977, unless otherwise noted.
[58 FR 35310, June 30, 1993; 61 FR 9227, March 7, 1996]

1910.401 Scope and Application

(a) Scope

(1) This subpart (standard) 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 within the Outer Continental Shelf lands as defined in the Outer Continental Shelf Lands Act (67 Stat. 462, 43 U.S.C. 1331), where diving and related 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, ship breaking and Long-shoring . However, this standard does not apply to any diving operation:

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

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

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

(iv) Defined as scientific diving and which is under the direction and control of a diving program containing at least the following elements (* see additional guidelines outlined in Appendix B of 1910 Subpart T, page 22):

(A) Diving safety manual which includes at a minimum: Procedures covering all diving operations specific to the program; procedures for emergency care, including recompression and evacuation; and criteria for diver training and certification.

(B) Diving control (safety) board, with the majority of its members being active divers*, which shall at a minimum have the authority to: Approve and monitor dive projects; review and revise the diving safety manual; assure compliance with the manual; certify the depths to which a diver has been trained; take disciplinary action for unsafe practices; and, assure adherence to the buddy

system (a diver is accompanied by and is in continuous contact with another diver in the water) for SCUBA diving.

(b) Application in emergencies. An employer may deviate from the requirements 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; and

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

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

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

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

[42 FR 37668, July 22, 1977, as amended at 47 FR 53365, Nov. 26, 1982; 58 FR 35310, June 30, 1993

1910.402 Definitions

(a) As used in this standard, the listed terms are defined as follows:

ACFM - Actual cubic feet per minute.

ASME Code or equivalent - ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code, Section VIII, or an equivalent code which the employer can demonstrate to be equally effective.

ATA - Atmosphere absolute.

Bell - An enclosed compartment, pressurized (closed bell) or un-pressurized (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.

Bursting pressure - The pressure at which a pressure containment device would fail structurally.

Cylinder - A pressure vessel for the storage of gases.

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 that may result from gas or bubbles in the tissues of divers after pressure reduction.

Decompression table - 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.

Dive-location reserve breathing gas - A supply system of air or mixed-gas (as appropriate) at the dive location that is independent of the primary supply system and sufficient to support divers during the planned decompression.

Dive team - Divers and support employees involved in a diving operation, including the designated person-in-charge.

Diver - An employee working in water using underwater apparatus that supplies compressed breathing gas at the ambient pressure.

Diver-carried reserve breathing gas - A diver-carried supply of air or mixed-gas (as appropriate) sufficient under standard operating conditions to allow the diver to reach the surface, or another source of breathing gas, or to be reached by a standby diver.

Diving mode - A type of diving requiring specific equipment, procedures, and techniques (SCUBA, surface-supplied air, or mixed-gas).

FSW - Feet of seawater (or equivalent static pressure head).

Heavy gear - Diver-worn deep-sea dress including helmet, breastplate, dry suit, and weighted shoes.

Hyperbaric conditions - Pressure conditions in excess of surface pressure.

In-water stage - A suspended underwater platform that supports a diver in the water.

Live-boating - The practice of supporting a surfaced-supplied air or mixed-gas diver from a vessel that is underway.

Mixed-gas diving - A diving mode in which the diver is supplied in the water with breathing gas other than air.

No-decompression limits (NDL) - The depth-time limits of the "no-decompression limits and repetitive dive group designation table for no-decompression air dives", U.S. Navy Diving Manual or equivalent limits that the employer can demonstrate to be equally effective.

PSI (g) - Pounds per square inch (gauge).

Scientific diving - diving performed solely as a necessary part of a scientific, research, or educational activity by employees whose sole purpose for diving is to perform scientific research tasks. Scientific diving does not include performing any tasks usually associated with commercial diving such as: Placing or removing heavy objects underwater; inspection of pipelines and similar objects; construction; demolition; cutting or welding; or the use of explosives.

SCUBA diving - A diving mode independent of surface-supply in which the diver uses open circuit self-contained underwater breathing apparatus.

Standby diver - A diver at the dive location available to assist a diver in the water.

Surface-supplied gas diving - A diving mode in which the diver in the water is supplied from the dive location with compressed gas for breathing.

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

Umbilical - The composite hose bundle between a dive location and a diver or bell, or between a diver and a bell, which supplies the diver or bell with breathing gas, communications, 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 connected to 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.

[42 FR 37668, July 22, 1977, as amended at 47 FR 53365, Nov. 26, 1982]

1910.410 Qualification of Dive Team

(a) General
- (1) Each dive team member shall have the experience or training necessary to perform task assignments in a safe and healthful manner.
- (2) Each dive team member shall have experience or training in the following:
  - (i) The use of tools, equipment, and systems relevant to task assignments;
  - (ii) Techniques of the assigned diving mode: and
  - (iii) Diving operations and emergency procedures.
- (3) All dive team members shall be trained in cardiopulmonary resuscitation and first aid (American Red Cross standard course or equivalent).
- (4) Dive team members who are exposed to or control the exposure of others to hyperbaric conditions shall be trained in diving-related physics and physiology.

(b) Assignments
- (1) Each dive team member shall be task assignments in accordance with the employee's experience or training, except limited additional tasks may be assigned to an employee undergoing training if 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 shall, 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 that is known to the employer and is likely to affect adversely the safety or health of a dive team member.

(c) Designated person-in-charge
- (1) The employer or an employee designated by the employer shall be at the dive location in charge of all aspects of the diving operation affecting the safety and health of dive team members.
- (2) The designated person-in-charge shall have experience and training in the conduct of the assigned diving operation.

1910.420 Safe Practices Manual

(a) General. The employer shall develop and maintain a safe practices manual that shall be made available at the dive location to each dive 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.
- (2) For each diving mode engaged in, the safe practices manual shall include:
  - (i) Safety procedures and checklists for diving operations;
  - (ii) Assignments and responsibilities of the dive team members:
  - (iii) Equipment procedures and checklists; and
  - (iv) Emergency procedures for fire, equipment failure, adverse environmental conditions, and medical illness and injury.

[42 FR 37668, July 22, 1977, as amended at 49 FR 18295, Apr. 30, 1984; 61 FR 5507, Feb. 13, 1996]

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 the dive 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) Available physicians;
- (4) Available means of transportation; and
- (5) The nearest U.S. Coast Guard Rescue Coordination Center.

(c) First Aid supplies
- (1) A 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 or bell, the First Aid kit shall be suitable for use under hyperbaric conditions.
- (3) In addition to any other First Aid supplies, an American Red Cross standard First Aid handbook or equivalent, and a bag-type manual resuscitator with transparent mask and tubing shall be available at the dive location.

(d) Planning and assessment. Planning of a diving operation shall include an assessment of the safety and health aspects of the following:
  (1) Diving mode:
  (2) Surface and underwater conditions and hazards;
  (3) Breathing gas supply (including reserves);
  (4) Thermal protection;
  (5) Diving equipment and systems:
  (6) Dive team assignments and physical fitness of dive team members (including any impairment known to the employer);
  (7) Repetitive dive designation or residual inert gas status of dive team members;
  (8) Decompression and treatment procedures (including altitude corrections); and
  (9) Emergency procedures.

(e) Hazardous activities. To minimize hazards to the dive team, diving operations shall be coordinated with other activities in the vicinity that are likely to interfere with the diving operation.

(f) Employee briefing
  (1) Dive team members shall be briefed on:
    (i) The tasks to be undertaken;
    (ii) Safety procedures for the diving mode;
    (iii) Any unusual hazards or environmental conditions likely to affect the safety of the diving operation; and
    (iv) 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 current state of physical fitness, and indicate to the dive team member the procedure for reporting physical problems or adverse physiological effects during and after the dive.

(g) Equipment inspection. The breathing gas supply system including reserve breathing gas supplies, masks, helmets, thermal protection, and bell handling mechanism (when appropriate) shall be inspected prior to each dive.

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

[42 FR 37668, July 22, 1977, as amended at 47 FR 14706, Apr. 6, 1982; 54 FR 24334, June 7. 1989; 61 FR 5507, Feb. 13, 1996]

1910.422 Procedures During Dive

(a) General. The employer shall comply with the following requirements that are applicable to each diving operation unless otherwise specified.

(b) Water entry and exit
  (1) A means capable of supporting the diver shall be provided for entering and exiting the water.
  (2) The means provided for exiting the water shall extend below the water surface.
  (3) A means shall be provided to assist an injured diver from the water or into a bell.

(c) Communications
  (1) An operational two-way voice communication system shall be used between:
    (i) Each surface-supplied air or mixed-gas diver and a dive team member at the dive location or bell (when provided or required); and
    (ii) The bell and the dive location.
  (2) An operational, two-way communication system shall be available at the dive location to obtain emergency assistance.

(d) Decompression tables. Decompression, repetitive, and no-decompression tables (as appropriate) shall be at the dive location.

(e) Dive profiles. A depth-time profile, including when appropriate any breathing gas changes, shall be maintained for each diver during the dive including decompression.

(f) Hand-held power tools and equipment
  (1) Hand-held electrical tools and equipment shall be de-energized before being placed into 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.

(g) Welding and burning.
  (1) A current supply switch to interrupt the current flow to the welding or burning electrode shall be:
    (i) Tended by a dive team member in voice communication with the diver performing the welding or burning; and
    (ii) Kept in the open position except when the diver is welding or burning.
  (2) The welding machine frame shall be grounded.
  (3) Welding and burning cables, electrode holders, and connections shall be capable of carrying the maximum current required by the work, and shall be properly insulated.
  (4) Insulated gloves shall be provided to divers performing welding and burning operations.
  (5) Prior to welding or burning on 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 vented, flooded, or purged with a mixture of gases which shall not support combustion.

(h) Explosives

(1) Employers shall transport, store, and use explosives in accordance with this section and the applicable provisions of 1910.109 and 1926.912 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 diver fails to respond correctly to communications or signals from a dive team member:
(3) Communications are lost and cannot be quickly re-established between the diver and a dive team member at the dive location, and between the designated person-in-charge and the person controlling the vessel in Live-boating operations; or
(4) A diver begins to use diver-carried reserve breathing gas or the dive-location reserve breathing gas.

1910.423 Post Dive Procedures

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

(b) Precautions
(1) After the completion of any dive, the employer shall:
(i) Check the physical condition of the diver:
(ii) Instruct the diver to report any physical problems or adverse physiological effects including symptoms of decompression sickness:
(iii) Advise the diver of the location of a decompression chamber which is ready for use; and
(iv) Alert the diver to the potential hazards of flying after diving.
(2) For any dive outside the no-decompression limits, deeper than 100 fsw or using mixed-gas as a breathing mixture, the employer shall instruct the diver to remain awake and in the vicinity of the decompression chamber which is at the dive location for at least one hour after the dive (including decompression or treatment as appropriate).

(c) Recompression capability
(1) A decompression chamber capable of recompressing the diver at the surface to a minimum of 165 FSW (six ATA) shall be available at the dive location for:
(i) Surface-supplied air diving to depths deeper than 100 fsw and shallower than 220 fsw;
(ii) Mixed-gas diving shallower than 300 fsw; or
(iii) Diving outside the no-decompression limits shallower than 300 fsw.
(2) 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 300 fsw.
(3) The decompression chamber shall be:
(i) Dual-lock;
(ii) Multiplace; and
(iii) Located within 5 minutes of the dive location.
(4) The decompression chamber shall be equipped with the following:
(i) A pressure gauge for each pressurized compartment designed for human occupancy:
(ii) A built-in-breathing-system with a minimum of one mask per occupant;
(iii) A two-way voice communication system between occupants and a dive team member at the dive location:
(iv) A view-port; and
(v) Illumination capability to light the interior.
(5) Treatment tables, treatment gas appropriate to the diving mode, and sufficient gas to conduct treatment shall be available at the dive location.
(6) 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).

(d) Record of dive
(1) The following information shall be recorded and maintained for each diving operation:
(i) Names of dive team members including designated person-in-charge:
(ii) Date, time, and location;
(iii) Diving modes used;
(iv) General nature of work performed:
(v) Approximate underwater and surface conditions (visibility, water temperature and current); and
(vi) Maximum depth and bottom time for each diver.
(2) For each dive outside the no-decompression limits, deeper than 100 fsw or using mixed-gas, the following additional information shall be recorded and maintained:
(i) Depth-time and breathing gas profiles:
(ii) Decompression table designation (including modification); and
(iii) Elapsed 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:
(i) Description of decompression sickness symptoms (including depth and time of onset); and
(ii) Description and results of treatment.

(e) Decompression procedure assessment. The employer shall:
  (1) Investigate and evaluate each incident of decompression sickness based on the recorded information, consideration of the past performance of decompression table used, and individual susceptibility:
  (2) Take appropriate corrective action to reduce the probability of recurrence of decompression sickness; and
  (3) Prepare a written evaluation of the decompression procedure assessment, including any corrective action taken, within 45 days of the incident of decompression sickness.

[42 FR 37668, July 22, 1977, as amended at 49 FR 18295, Apr. 30, 1984; 61 FR 5507, Feb. 13, 1996]

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 130 fsw;
  (2) At depths deeper than 100 fsw or outside the no-decompression limits unless a decompression chamber is ready for use:
  (3) Against currents exceeding one (1) knot unless line-tended; or
  (4) In enclosed or physically confining spaces unless line-tended.
(c) Procedures
  (1) A standby diver shall be available while a diver is in the water.
  (2) A diver shall be line-tended from the surface, or accompanied by another diver in the water in continuous visual contact during the diving operations.
  (3) A diver shall be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces.
  (4) A diver-carried reserve breathing gas supply shall be provided for each diver consisting of:
    (i) A manual reserve (J valve); or
    (ii) An independent reserve cylinder with a separate regulator or connected to the underwater breathing apparatus.
  (5) The valve of the reserve breathing gas supply shall be in the closed position prior to the dive.

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 190 fsw, except that dives with bottom times of 30 minutes or less may be conducted to depths of 220 fsw.
  (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 fsw.
  (3) A bell shall be used for dives with an in-water decompression time >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) For dives deeper than 100 fsw or outside the no-decompression limits:
    (i) A separate dive team member shall tend each diver in the water:
    (ii) A standby diver shall be available while a diver is in the water:
    (iii) A diver-carried reserve breathing gas supply shall be provided for each diver except when heavy gear is worn; and
    (iv) A dive-location reserve breathing gas supply shall be provided.
  (5) For heavy-gear diving deeper than 100 fsw or outside the no-decompression limits:
    (i) An extra breathing gas hose capable of supplying breathing gas to the diver in the water shall be available to the standby diver.
    (ii) An in-water stage shall be provided to divers in the water.
  (6) Except when heavy gear is worn or where physical space does not permit, a diver-carried reserve breathing gas supply shall be provided whenever the diver is prevented by the configuration of the dive area from ascending directly to the surface.

1910.426 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
    (i) A bell is used at depths >220 fsw or when the dive involves in-water decompression time of >120 minutes, except when heavy gear is worn or when diving in physically confining spaces; or

(ii) A closed bell is used at depths >300 fsw, except when diving is 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 point of entry when diving is conducted in enclosed or physically confining spaces.
- (4) Each diving operation shall have a primary breathing gas supply sufficient to support divers for the duration of the planned dive including decompression.
- (5) Each diving operation shall have a dive-location reserve breathing gas supply.
- (6) When heavy gear is worn:
  - (i) An extra breathing gas hose capable of supplying breathing gas to the diver in the water shall be available to the standby diver; and
  - (ii) An in-water stage shall be provided to divers in the water.
- (7) An in-water stage shall be provided for divers without access to a bell for dives deeper than 100 fsw or outside the no-decompression limits.
- (8) When a closed bell is used, one dive team member in the bell shall be available and tend the diver in the water.
- (9) 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:
  - (i) Diving deeper than 100 fsw or outside the no-decompression limits; or
  - (ii) Prevented by the configuration of the dive area from directly ascending to the surface.

1910.427 Live-boating

(a) General. Employers engaged in diving operations involving Live-boating shall comply with the following requirements.

(b) Limits. Diving operations involving Live-boating shall not be conducted:
- (1) With an in-water decompression time of >120 minutes:
- (2) Using surface-supplied air at depths deeper than 190 fsw, except that dives with bottom times of 30 minutes or less may be conducted to depths of 220 fsw:
- (3) Using mixed-gas at depths >220 fsw;
- (4) In rough seas which significantly 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 Live-boating operations.

1910.430 Equipment

(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, and the name or initials of the person performing the work.

(b) Air compressor system
- (1) Compressors used to supply air to the diver shall be equipped with a volume tank with a check valve on the inlet side, a pressure gauge, a relief valve, and a drain valve.
- (2) Air compressor intakes shall be located away from areas containing exhaust or other contaminants.
- (3) Respirable air supplied to a diver shall not contain:
  - (i) A level of carbon monoxide (CO) >20 p/m;
  - (ii) A level of carbon dioxide (CO (2)) >1,000 ppm;
  - (iii) A level of oil mist >5 milligrams per cubic meter; or
  - (iv) A noxious or pronounced odor.
- (4) The output of air compressor systems shall be tested for air purity every 6 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.

(c) Breathing gas supply hoses.
- (1) Breathing gas supply hoses shall:
  - (i) Have a working pressure at least equal to the working pressure of the total breathing gas system:
  - (ii) Have a rated bursting pressure at least equal to four times the working pressure:
  - (iii) Be tested at least annually to 1.5 times their working pressure; and
  - (iv) Have their open ends taped, capped, or plugged when not in use.
- (2) Breathing gas supply hose connectors shall:
  - (i) Be made of corrosion-resistant materials:

(ii) Have a working pressure at least equal to the working pressure of the hose to which they are attached; and
(iii) Be resistant to accidental disengagement.
(3) Umbilical's shall:
(i) Be marked in 10-ft. increments to 100 feet beginning at the diver's end, and in 50 ft. increments thereafter:
(ii) Be made of kink-resistant materials; and
(iii) Have a working pressure greater than the pressure equivalent to the maximum depth of the dive (relative to the supply source) plus 100 psi.

(d) Buoyancy control
(1) Helmets or masks connected directly to the dry suit or other buoyancy-changing equipment shall be equipped with an exhaust valve.
(2) A dry suit or other buoyancy-changing equipment not directly connected to the helmet or mask shall be equipped with an exhaust valve.
(3) When used for SCUBA diving, a buoyancy compensator shall have an inflation source separate from the breathing gas supply.
(4) An inflatable flotation device capable of maintaining the diver at the surface in a face-up position, having a manually activated inflation source independent of the breathing supply, an oral inflation device, and an exhaust valve shall be used for SCUBA diving.

(e) Compressed gas cylinders. Compressed gas cylinders shall:
(1) Be designed, constructed and maintained in accordance with the applicable provisions of 29 CFR 1910.101 and 1910.169 through 1910.171.
(2) Be stored in a ventilated area and protected from excessive heat:
(3) Be secured from falling; and
(4) Have shut-off valves recessed into the cylinder or protected by a cap, except when in use, when used on a manifold, or when used for SCUBA diving.

(f) Decompression chambers
(1) Each decompression chamber manufactured after the effective date of this standard, shall be built and maintained in accordance with the ASME Code or equivalent.
(2) Each decompression chamber manufactured prior to the effective date of this standard shall be maintained in conformity with the code requirements to which it was built, or equivalent.
(3) Each decompression chamber shall be equipped with:
(i) Means to maintain the atmosphere below a level of 25% oxygen by volume:
(ii) Mufflers on intake and exhaust lines, which shall be regularly inspected and maintained;
(iii) Suction guards on exhaust line openings; and
(iv) A means for extinguishing fire, and shall be maintained to minimize sources of ignition and combustible material.

(g) Gauges and timekeeping devices
(1) Gauges indicating diver depth that can be read at the dive location shall be used for all dives except SCUBA.
(2) Each depth gauge shall be deadweight tested or calibrated against a master reference gauge every 6 months, and when there is a discrepancy >2% of full scale between any two equivalent gauges.
(3) A cylinder pressure gauge capable of being monitored by the diver during the dive shall be worn by each SCUBA diver.
(4) A timekeeping device shall be available at each dive location.

(h) 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) An 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's inspired 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.

(i) Oxygen safety
(1) Equipment used with oxygen or mixtures containing >40% by volume oxygen shall be designed for oxygen service.
(2) Components (except umbilicals) exposed to oxygen or mixtures containing >40% by volume oxygen shall be cleaned of flammable materials before use.
(3) Oxygen systems over 125 psig and compressed air systems over 500 psig shall have slow-opening shut-off valves.

(j) 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 SCUBA diving, each diver shall wear a safety harness with:
(i) A positive buckling 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.

[39 FR 23502, June 27, 1974, as amended at 49 FR 18295, Apr. 30, 1984; 51 FR 33033, Sept. 18, 1986; 61 FR 5507, Feb. 13, 1996]

1910.440 Record keeping requirements

(a)(1)[Reserved]

(2) The employer shall record the occurrence of any diving-related injury or illness that requires any dive team member 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 and Human Services of their designees, the employer shall make available for inspection and copying any record or document required by this standard.

(2) Records and documents required by this standard shall be provided upon request to employees, designated representatives, and the Assistant Secretary in accordance with 29 CFR 1910.20 (a)-(e) and (g)-

(i) Safe practices manuals (1910.420); depth-time profiles (1910.422), recordings of dives (1910.423), decompression procedure assessment evaluations (1910.423), and records of hospitalizations (1910.440) shall be provided in the same manner as employee exposure records or analyses using exposure or medical records. Equipment inspections and testing records that pertain to employees (1910.430) shall also be provided upon request to employees and their designated representatives.

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

(i) Dive team member medical records (physician's reports) (1910.411) - 5 years;

(ii) Safe practices manual (1910.420) - current document only:

(iii) Depth-time profile (1910.422) - until completion of the recording of dive, or until completion of decompression procedure assessment where there has been an incident of decompression sickness;

(iv) Recording of dive (1910.423) - 1 year, except 5 years where there has been an incident of decompression sickness:

(v) Decompression procedure assessment evaluations (1910.423) - 5 years;

(vi) Equipment inspections and testing records (1910.430) - current entry or tag, or until equipment is withdrawn from service;

(vii) Records of hospitalizations (1910.440) - 5 years.

(4) After the expiration of the retention period of any record required to be kept for five (5) years, the employer shall forward such records to the National Institute for Occupational Safety and Health, Department of Health and Human Services. The employer shall also comply with any additional requirements set forth at 29 CFR 1910.20(h).

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

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

(ii) 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 and Human Services.

[42 FR 37668, July 22, 1977, as amended at 45 FR 35281, May 23, 1980; 47 FR 14706, Apr. 6, 1982; 51 FR 34562, Sept. 29, 1986; 61 FR 5507, Feb. 13, 1996; 61 FR 9227, March 7, 1996]

1910.441 Effective Date

This standard shall be effective on October 20, 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 to 1910 Subpart T

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

1. History of seizure disorders other than early febrile convulsions.
2. Malignancies (active) unless treated and without recurrence for5 yrs.
3. Chronic inability to equalize sinus and/or middle ear pressure.
4. Cystic or cavitary disease of the lungs.
5. Impaired organ function caused by alcohol or drug use.
6. Conditions requiring continuous medication for control (e.g., antihistamines, steroids, barbiturates, mood altering drugs, or insulin).
7. Meniere's disease.
8. Hemoglobinopathies.
9. Obstructive or restrictive lung disease.
10. Vestibular end organ destruction.
11. Pneumothorax.
12. 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).
13. Juxta-articular osteonecrosis.

Appendix B to 1910 Subpart T

This appendix contains guidelines that shall be used in conjunction with 1910.401(a)(2)(iv) to determine those scientific diving programs that are exempt from the requirements for commercial diving. The guidelines are as follows:

1. The Diving Control Board consists of a majority of active scientific divers and has autonomous and absolute authority over the scientific diving program's operations.
2. The purpose of the project using scientific diving is the advancement of science; therefore, information and data resulting from the project are non-proprietary.
3. The tasks of a scientific diver are those of an observer and data gatherer. Construction and trouble-shooting tasks traditionally associated with commercial diving are not included within scientific diving.
4. Scientific divers, based on the nature of their activities, must use scientific expertise in studying the underwater environment and, therefore, are scientists or scientists in training.

[50 FR 1050, Jan. 9, 1985]

Section 12.0

Glossary

12.0 GLOSSARY

Actual Cubic Feet per Minute (ACFM)
The actual volume of a gas supplied to a diver, bell, etc. at ambient pressure.

Air Sharing
Sharing of a gas supply between divers.

Air
A naturally occurring gas mixture comprising approximately four-fifths nitrogen, one-fifth oxygen, and various trace gases.

Ambient Pressure
The surrounding pressure at depth (actual or simulated) to which the diver, etc. is subjected.

Appropriate Breathing Mix
A breathing mixture which, having regard to the system and equipment used in the dive operations, the work undertaken in those operations, and the conditions in which and the depth at which they are to be carried out, is suitable in content and temperature and of adequate depth. Per TAMU-CC regulations, will be defined as having an Equivalent Air Depth (EAD) of 130 feet and a Partial Pressure of Oxygen (PPO2) no greater than 1.6 (resting) at Maximum Operating Depth (MOD).

Ascent Time
The time interval between leaving the bottom when the dive is terminated and reaching the surface.

ASME Code or equivalent
American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section VIII, or an equivalent code which the employer can demonstrate to be equally effective.

Atmospheres Absolute (ATA)
Total pressure exerted on an object at a specific depth or elevation. In diving, the sum of barometric pressure and hydrostatic pressure.

Bailout
An emergency where a diver leaves bottom and comes directly to the surface, exceeding normal controlled ascent rates and missing scheduled decompression water stops.

Bailout Bottle
See Reserve Gas Supply (RGS).

Bell
An enclosed compartment, pressurized (closed bell) or un-pressurized (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.

Bends
See Decompression Sickness.

Bottom Time
The total elapsed time measured in minutes from the time the diver leaves the surface and begins descent, to the time that the diver begins a direct ascent to the surface.

Breath-hold Diving
A diving mode in which a diver is subject to a hyperbaric environment while using no self-contained or surface-supplied gas supply.

Breathing System
Device or apparatus for delivering breathing gas mixture.

Buddy Breathing
The sharing of a single gas source between divers.

Buddy System
Comparably equipped scuba divers in the water in constant communication.

Buoyant Ascent
An ascent made using some form of positive buoyancy.

Burst pressure
The pressure at which a pressure containment device will structurally fail.

Cameras
Cameras, diver carried and remote, are effective tools for the scientific diver in aiding with capture of natural phenomena, mechanical apparatus movement/behavior, archeological sites etc. The advancements in camera technology over the past decade(s) has made these tools compact and relatively inexpensive, allowing for most scientific diving operations to employ the benefits of these tools.

Certified Diver
A diver who holds a valid certification from a recognized certifying agency. If diving under university auspices, a diver who holds a TAMU-CC certification or is certified by another AAUS Organizational Member.

Cleaned for Oxygen Service
Cleaning of equipment or system to ensure elimination of all hydrocarbons and other potentially dangerous contaminants when system will be used in oxygen service. See also Oxygen Cleaning.

CNS
Central Nervous System

Confined Space
Any space which would restrict the diver's ability to rotate himself head to toe, 180° degrees in any plane and/or when the diver has no direct access to the surface.

Compressor
A machine that raise air or other gasses to a pressure above one atmosphere.

Controlled Ascent
Any one of several kinds of ascents including normal, swimming, and buddy breathing ascents where the diver(s) maintain control so a pause or stop can be made during the ascent.

CPR
Cardio-Pulmonary Resuscitation. A combination of artificial respiration and artificial circulation.

Cylinder
A pressure vessel for the storage of gases.

DAN
The Divers Alert Network, affiliated with the Duke University Medical Center, Durham, North Carolina.

Decompression
Releasing from pressure or compression following a specific decompression table or procedure during ascent: ascending in the water or experiencing decreased pressure in the chamber.

Decompression Chamber
A pressure vessel for human occupancy. Also called a hyperbaric chamber or recompression chamber.

Decompression Schedule
A time-depth profile with a specific bottom time and depth, whose application is calculated to reduce the pressure on a diver safely.

Decompression Sickness
A condition with a variety of symptoms that may result from gas bubbles in the tissues of divers after pressure reduction.

Decompression Table
A set of decompression schedules computed on a common protocol.

Designated Person in Charge (DPIC)
The Person designated as having complete responsibility for the safety of the dive operation including the responsibility for the safety and health of all diving personnel.

Dive
An exposure to increased pressure whether under water or in a hyperbaric chamber.

Dive Computer
A microprocessor based device that computes a diver's theoretical decompression status, in real time, by using pressure (depth) and time as input to a decompression model, or set of decompression tables, programmed into the device.

Dive Lights
Dive lights designed for underwater use come in many different configurations, light output and size. Modern dive lights tend to have internal rechargeable batteries, variable lumen output and attachment points for easy installation of clips and/or lanyards for ease of stowage while conducting scientific diving operations. Uses range from night diving, cave/cavern diving, low visibility diving or on deeper dives where true colors of objects must be examined.

Dive Location
A surface or vessel from which a dive operation is conducted.

Dive Location Reserve Breathing Gas
A supply system of air or mixed-gas (as appropriate) at the dive location that is independent of the primary supply system and sufficient to support divers during any planned decompression dive.

Dive Site
The physical location of a diver during a dive.

Dive Station
See Dive Site.

Dive Table
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. Also called dive tables.

Dive Team
Any individual exposed to or controlling the exposure of others to hyperbaric conditions.

Diver
An individual in the water who uses apparatus, including snorkel, to supply breathing gas at ambient pressure.

Diver-in-Training
An individual gaining experience and training in additional diving activities under the supervision of a dive team member experienced in those activities.

Diver Propulsion Vehicle (DPV)
A diver propulsion vehicle (DPV), also known as a scooter, is an item of diving equipment used by divers to increase range underwater. Range and/or Time limits are restricted by the amount of breathing gas that can be carried, the rate at which that breathing gas is consumed, the battery power/duration of the DPV and any potential decompression requirements. DPV's are available in different sizes and configurations.

Diving Control Board (DCB)
The group of individuals who act as the official representative of TAMU-CC in matters concerning the diving program.

Diving Mode
A type of diving requiring specific equipment, procedures, and techniques, for example, snorkel, scuba, surface-equipped air, or mixed-gas.

Diving Operations
Any work operation requiring some type of diving or work underwater that involves planned human exposure to increased pressures to perform the job.

Diving Operating Personnel
Any member of a dive team whose activities are regularly scheduled as necessary to conduct diving operations at or from the dive station.

Diving Safety Officer (DSO)
The individual responsible for the safe conduct of the diving program.

Dry Suit
A diving suit designed to exclude water from the surface of the body.

EAD
See Equivalent Air Depth.

Emergency Ascent
An ascent made under emergency conditions where the diver exceeds the recommended ascent rate.

Emergency Gas Source
See Reserve Gas Supply (RGS).

Enriched Air (EANx)
A name for a breathing mixture of air and oxygen when the percentage of oxygen exceeds 21%. This term is considered synonymous with the term “NITROX”.

Equivalent Air Depth (EAD)
Depth at which the gas mixture being used will have the same nitrogen partial pressure as air at one atmosphere (sea level). This number, expressed in units of feet of seawater, will always be less than the actual depth for any enriched air mixture.

Exhaust Valve
A valve controlling the venting of gas from any higher-pressure source such as a divers helmet, suit, buoyancy compensator, volume tank, etc.

Embolism
See Gas Embolism.

fHe
Fraction of helium in a gas mixture, expressed as either a decimal or percentage, by volume.

fN2
Fraction of nitrogen in a gas mixture, expressed as either a decimal or percentage, by volume.

fO2
Fraction of oxygen in a gas mixture, expressed as either a decimal or percentage, by volume.

ffw
Feet of freshwater or equivalent static head.

fsw
Feet of seawater, or equivalent static head.

Full Face Mask
Full Face Masks are diving masks that have an integrated regulator. Full Face Masks (FFM) can allow for through water voice communication between divers and the surface, can decrease exposure in contaminated

environments, can limit some cold water exposure, and may be used to protect a diver's airway if they are prone to seizure or other medical compromises. While diving a FFM can provide advantages divers should be aware that FFM may also cause greater air consumption, can pose more complex procedures for out of air emergencies, and may be a little more difficult to equalize air spaces.

Gas
In diving, any respirable mixture breathed by the diver.

Gas Embolism
A condition caused by expanding gases that have been taken into and retained in the tissues during ascent or decompression.

Gauge Pressure
A term used to express the difference between atmospheric pressure and a specific pressure being measured. Abbreviated as psig, pounds per square inch gauge.

Handheld Underwater Power Tools
Handheld underwater power tools are battery, pneumatically or hydraulically powered tools that enhance the scientific diver's abilities to complete tasks efficiently. Small handheld drills, impact hammers & wrenches and grinders are examples of handheld underwater power tools available to the scientific diver. Handheld underwater power tools are lightweight and assist the scientific diver in tasks such as creating holes in substrate, removing and collecting organisms or fixed items from benthic environments and establishing secure locations for scientific apparatus like sensors, automated sampling equipment or grids.

Harness
The combination of straps and fasteners used to attach equipment and umbilical to the diver that can be utilized as a lifting point to remove the diver from the water in the event of an emergency.

Hookah Diving
A diving mode in which the diver in the water is supplied from the dive location with compressed gas for breathing and has no voice communication with the tender on the surface.

Hyperbaric Chamber
See Decompression Chamber.

Hyperbaric Conditions
Pressure conditions in excess of normal atmospheric pressure at the dive location.

Hypothermia
Profound loss of body heat.

Lead Diver
Certified diver with experience and training to conduct the dive operation within under University auspices.

Lift Bags
Lift bags are used to move items to the surface, laterally to new locations, or to suspend apparatus mid-water, due to their size, weight and/or shape. Lift bags are available in many configurations, lift capacity, and constructed out of a myriad of materials. Additionally, lifting operations employing lift bags can be conducted with divers in the water and remotely, dependent upon operational needs and configurations. In all instances, divers are required to complete the rigging of the lift bags to the object.

Line Reels and Spools
Line reels and spools are designed to carry braided, nylon line on a drum and can be of varying sizes and line capacities. Reels tend to have a large capacity, have a guide for the line to aid the diver in paying out or loading the reel and are made of rugged materials specifically designed for underwater use. Spools are much simpler in design, are simply a drum of plastic, delrin or metal with braided and tend to carry less length of line than a reel. There are two general categories of use for line reels and spools: aid in navigation or searching and aid in surfacing when line is fixed to a surface marker.

MAWP
Maximum allowable working pressure. See Maximum Working Pressure.

MSW
Meters of seawater or equivalent static head.

Maximum Operating Depth (MOD)
A depth at which the PPO2 (partial pressure of oxygen) for a gas mixture reaches a predetermined maximum.

Maximum Working Pressure
The maximum pressure to which a pressure vessel may be exposed under standard operating conditions (usually the pressure setting of the pressure relief device).

Mixed-gas diving
AAUS defined diving mode in which the diver is supplied in the water with breathing gases with > 1% of another inert gas besides nitrogen. Sometimes referred to as Trimix.

Nitrox
Any gas mixture comprised predominately of nitrogen and oxygen, most frequently containing between 21% and 40% oxygen. Also referred to as Enriched Air Nitrox, abbreviated EANx.

NOAA
National Oceanic and Atmospheric Administration; a branch of the U.S. Department of Commerce.

No-Decompression Diving
Diving which involves depths and times shallow and short enough so that the ascent can be made to the surface without water stops or subsequent chamber decompression.

No-Decompression Limits
The depth-time limits of the "no-decompression limits and repetitive dive group designation table for no-decompression air dives" of the U.S. Navy Diving Manual or equivalent limits.

Non-Return Valve (Check Valve)
A one-way check valve installed in a fluid or gas system to permit flow in one direction only. All diving helmets must have a non-return valve at the gas supply inlet to prevent depressurization of the helmet and the resultant squeeze, if the gas supply is lost.

Normal Ascent
An ascent made with an adequate gas supply at a rate of 60 feet per minute or less.

Organizational Member
An organization who is a current member of the AAUS, and which has a program, which adheres to the standards of the AAUS as, set forth in the AAUS Standards for Scientific Diving Certification and Operation of Scientific Diving Programs.

Over Bottom Pressure (OBP)
That pressure above ambient, at which a breathing gas supply must be supplied to the helmet/mask so that the diver will have a sufficient supply of gas.

Oxygen Cleaning
A special cleaning process for equipment used in oxygen systems to remove flammable/combustible contaminants.

Oxygen Compatible
A gas delivery system that has components (O-rings, valve seats, diaphragms, etc.) that is compatible with oxygen at a stated pressure and temperature.

Oxygen Service
A gas delivery system that is both oxygen clean and oxygen compatible.

Oxygen Toxicity
Any adverse reaction of the central nervous system (“acute” or “CNS” oxygen toxicity) or lungs (“chronic”, “whole body”, or “pulmonary” oxygen toxicity) brought on by exposure to an increased (above atmospheric levels) partial pressure of oxygen.

Partial Pressure
That portion of the total gas pressure exerted by a particular constituent of the breathing mixture.

Pressure-related Injury
Any injury resulting from pressure dis-equilibrium within the body as the result of hyperbaric exposure. Examples include decompression sickness, pneumothorax, mediastinal emphysema, air embolism, subcutaneous emphysema, or ruptured eardrum.

Pressure Vessel
See Cylinder.

PPN2
Inspired partial pressure of nitrogen, usually expressed in units of atmospheres absolute.

PPO2
Inspired partial pressure of oxygen, usually expressed in units of atmospheres absolute.

psi
Pounds per square inch. An expression of pressure, for example, one atmosphere equals 14.7 psi.

psig
Pounds per square inch gauge.

Recompression Chamber
See Decompression Chamber.

Relief Valve
A pressure-relieving device that prevents pressure from rising above a preset level.

Reserve Gas Supply (RGS)
A diver-carried independent supply of air or mixed-gas (as appropriate) sufficient under standard operating conditions to allow the diver to reach the surface, or another source of breathing gas, or to be reached by another diver.

Sampling Equipment
Sampling equipment is a broad category of equipment used to collect many types of data while underwater. These items include, but are not limited to: transect tapes, quadrats, slates and other writing instruments, hand nets, sample collection storage, coring/vibra-coring, diver controlled suction and air-lift, and traps.

Small Hand Tools
Small Hand Tools are any manually powered tool used for basic underwater tasks. Examples include, but are not limited to: dive knives & line cutters, screwdrivers, hammers, wrenches, pliers, prybars, hand saws, shears, clips, lines, zip ties etc.

Scientific Diving
Is defined (29CFR1910.402) as diving performed by individuals performed solely as a necessary part of a scientific, research, or educational activity by employees whose sole purpose for diving is to perform scientific research tasks. Scientific diving does not include performing any tasks usually associated with commercial diving such as: Placing or removing heavy objects underwater; inspection of pipelines and similar objects; construction; demolition; cutting or welding; or the use of explosives.

SCUBA Diving
Acronym for Self Contained Underwater Breathing Apparatus. Used to describe a diving mode in which the inspired gas is delivered from a demand regulator and exhaled into the surrounding water (open-circuit); the gas supply is carried on the diver's back. Primarily used for relatively shallow recreational-related diving.

Snorkeling
See Breath-hold diving.

Spearguns and Polespears
Spearguns and polespears can range in size and length. Each tool consists of a spear tip end for capturing organisms with a mechanism for projecting the spear, either by way of trigger (speargun) or a simple rubber sling (polespear). These tools are constructed out of a wide variety of marine grade materials such as fiberglass, wood, plastics and steel.

Squeeze
A lack of equalization between part of the body or between the body and equipment. Extreme cases can cause severe injury or death.

Standby Diver
A diver at the dive location in a state of readiness, capable of rendering immediate and rapid assistance to a diver in the water.

Surface-supplied Diving
Diving mode in which the diver in the water is supplied breathing gas from a supply on the surface and is in constant voice communication with the tender on the surface.

Surface Marker Buoy
Surface Marker Buoys vary in length and volume and are equipped with a means of (1) inflation while at depth (pneumatically or orally) and (2) venting gas to ensure the buoy does not experience rupture and lose buoyancy during ascent. These types of buoys are generally used to indicate a diver or dive team's location during ascent in areas where operational hazards exist or challenging conditions are encountered, i.e. shipping/boating lanes, blue water ascents with currents. They also allow for points of reference during decompression, both recommended and mandatory stops. They can also be utilized to mark locations of items on the bottom to ensure an efficient retrieval can be made or the location can be revisited easily. Generally, SMBs are not permanent installations but instead a short term surface marker.

Swimming Ascent
An ascent that can be done under normal or emergency conditions accomplished by simply swimming to the surface.

Tender
The individual responsible for seeing the diver receives care both topside and underwater; also called the attendant.

Tether
A dive equipment component that serves to link a diver and topside personnel at the dive location and consists of one or more members of an umbilical: a strength member, a communications cable, a gas line, and a pneumofathometer.

Treatment Table
A depth-time and breathing gas profile designed to treat decompression sickness or air embolism.

Umbilical
The composite hose bundle between a dive location and a diver or bell, or between a diver and a bell, which supplies the diver or bell with breathing gas, communications, power, and heat, as appropriate to the diving mode or conditions, and includes a safety line between the diver and the dive location.

Underwater Time
The total elapsed time measured in minutes, from the time when a diver leaves the surface in descent until the diver returns to the surface.

Valve
A device that starts, stops, or regulates the flow of fluids.

Volume Tank
A pressure vessel connected to the outlet of a compressor and used as an gas reservoir.

Weight Belt
A belt worn by a diver to achieve desired buoyancy.

Working Diving
Is defined (29CFR1910.402(a)(2)) as any diving and related support operations conducted in connection with all types of work and employment. Working diving does not apply to diving operations performed solely for: instructional purposes; search, rescue, or related public safety purposes; governed by 45 CFR Part 46 (Protection of Human Subjects, U.S. Department of Health and Human Services) or equivalent rules or

regulations established by another federal agency; or scientific diving and which is under the direction and control of a diving program consisting, at a minimum, of a diving control board and dive safety manual.

Working Pressure

The maximum pressure at which the system is designed to operate under standard conditions.

Work Site

An underwater location where work is performed.