TEXAS A&M UNIVERSITY
SAN ANTONIO

Diving Standards for Underwater Operations

December 2024

TEXAS A&M UNIVERSITY-SAN ANTONIO
Dive Program

Diving Standards for Underwater Operations

EDITOR/AUTHOR

Dr. Fernando Calderón Gutiérrez

Approved and Published by the A&M-SA Dive Safety Board
Texas A&M University - San Antonio
San Antonio, TX
First Edition, December 2024

Dive Program

Edition 1 of the Texas A&M University - San Antonio Diving Standards for Underwater Operations has been reviewed and is approved for implementation by the Dive Safety Board.

Elizabeth Borda, PhD
Associate Professor in Biology
Department of Natural Sciences
Texas A&M University - San Antonio

Victor Pantusa, MS
Environmental Health & Safety
Office of Research Compliance
Texas A&M University - San Antonio

Marissa Nuttall, MS
Unit Dive Supervisor
Flower Garden Banks National Marine Sanctuary
National Oceanic and Atmospheric Administration

Larry Lloyd, MS
Dive Safety Officer
Texas A&M University Corpus Christi

Fernando Calderón Gutiérrez, PhD
Chair, Dive Safety Board
Dive Safety Officer
Texas A&M University - San Antonio

FOREWORD

SCUBA diving was first used at Texas A&M University - San Antonio in the Fall of 2022 as part of a collaborative project on underwater caves with Woods Hole Oceanographic Institution and the United States Geological Survey. Two years later it was established the A&M-SA Dive Program with the support of TAMU-CC and NOAA – Flower Garden Banks National Marine Sanctuary with the endeavor to advance and facilitate safe and productive diving activities within and outside the university. A&M-SA benefited from over 70 years of experience of the scientific diving community in the establishment the Dive Program and the Diving Standards for Underwater Operations, following the conditions outlined by OSHA in the exemption for scientific diving, and the standards set by the American Academy of Underwater Sciences.

This manual sets forth the policies, procedures and standards that govern training and diving operations of all personnel participating in diving programs associated with Texas A&M University - San Antonio. It applies to all divers operating under University's auspices, including all students in training, visiting divers, individuals who wish to dive from University facilities, all divers who are using University equipment, and campus officials responsible for the management and administration of diving research, education and training. Furthermore, this manual was written to ensure all diving under the A&M-SA auspices is conducted in a manner to minimize the associated risk, and with the spirit to promote collaboration and the advancement of safe diving practices.

All divers are encouraged to exceed the requirements set in this manual and always pursue to learn and improve the knowledge and skills required to conduct safe and fruitful underwater activities.

Dr. Fernando Calderón Gutiérrez
Dive Safety Officer
Texas A&M University - San Antonio

RECORD OF CHANGES

Date	Section	Description

TEXAS A&M UNIVERSITY-SAN ANTONIO

Dive Program

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Section 1. GENERAL DIVING POLICY

The purpose of Texas A&M University - San Antonio (A&M-SA or university) Diving Standards for Underwater Operations (manual) is to ensure that all individuals who dive under the auspices of the University follow the rules and regulations regardless of the geographic location or the specific underwater tasks performed. For these policies and procedures to be effective, all individuals diving under university auspices must be familiar with the A&M-SA Diving Standards for Underwater Operations. A&M-SA is not an organizational member of the American Academy of Underwater Sciences (AAUS), but follows or exceeds the standards set by AAUS.

This manual sets minimal standards for the establishment of the A&M-SA diving program to conduct scientific and recreational diving activities in a manner that will maximize protection of all divers from accidental injury or illness, and to set forth standards for training and certification that will allow a working reciprocity with AAUS organizational members. Fulfillment of the purpose must be consistent with the furtherance of research and safety, and facilitation of collaborative opportunities requiring diving techniques.

This manual was originally developed and written by the AAUS by compiling the policies set forth in the diving manuals of several university, private, and governmental scientific diving programs. These programs share a common heritage with the scientific diving program at the Scripps Institute of Oceanography. The standards have been adapted, as necessary to meet the unique needs of the A&M-SA Dive Program.

1.1 Review of Standards

A&M-SA Diving Standards for Underwater Operations is considered a “living document” with continuous amendments by the DSB, as necessary, to remain current with best practices in SCUBA diving, and to reflect the development of the A&M-SA Dive Program. The DSB will ensure that an electronic copy of the current manual is available.

Any member of the A&M-SA Dive Program can propose an amendment to the A&M-SA Diving Standards for Underwater Operations by submitting a request in writing to the DSO or DSB for its discussion on the next DSB Meeting Agenda, or through ongoing

activities in a DSB meeting. Decisions regarding amending the A&M-SA manual will be discussed and deliberated during DSB meetings.

Policy resolving conflict between A&M-SA and/or TAMUS policies and this manual

Nothing in this manual should be construed to circumvent the general policies of Texas A&M University - San Antonio or Texas A&M University System (TAMUS). Conflicts between policies should be immediately brought to the attention of the DSB for guidance or resolution, prior to the continuance of activities with potential policy conflicts.

Policy resolving conflict between AAUS and this manual

Where not specifically addressed in this manual, AAUS guidelines, if established, set forth in the above publication will be considered binding. Final interpretation of conflicting or unclear standards should fall to DSB as soon as reasonably possible.

Any deviations or significant changes related to Scientific diving on this manual to AAUS minimum standards activities require approval by the DSB.

Policy regarding ambiguity between policies or references

If application of specific regulation in the following sections is not clear, or if there exist conflicts between different policies or references compliance will be based on the following:

A. Before diving activities occur
    I- The DSO decision based on safety and need
        i. The DSO will report to the DSB in a timely fashion, including an explanation of the circumstances and justification of the action(s) taken
        ii. Any member of the DSB, including the DSO, may request the issue to be voted by the DSB before diving activities can be approved
B. While diving activities are being conducted
    I- The regulations that promote the greatest safety to the diver
        i. Depending on the circumstances, the DSO or Lead Diver will make the decision
        ii. The Lead Diver will only make the decision if it is no possible to contact the DSO

iii. The DSO or the Lead Diver, whoever made the decision, will report to the DSB in a timely fashion, including an explanation of the circumstances and justification of the action(s) taken

II- The DSO decision based on safety and need

i. The DSO will report to the DSB in a timely fashion, including an explanation of the circumstances and justification of the action(s) taken

III- In an emergency where danger to life or wellbeing exists, or is probable, a diver may violate standards outlined in this manual at their own discretion

i. The diver will report to the DSB in a timely fashion, including an explanation of the circumstances and justification of the action(s) taken

1.2 Scientific Diving Standards

In 1982, OSHA exempted scientific diving from commercial diving regulations (29CFR1910, Subpart T) under certain conditions that are outlined below. The final guidelines for the exemption became effective in 1985 (Federal Register, Vol. 50, No.6, p.1046). AAUS is recognized by OSHA as the scientific diving standard setting organization.

Scientific Diving Definition

Scientific diving is defined (29CFR1910.402) as: "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."

OSHA Scientific Diving Exemption

The two elements that a diving program must contain as defined by OSHA in 29 CFR 1910 Subpart T 1910.401(a)(2)(iv) are:

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 (DSB), with the majority of its members being active divers, which must at a minimum have 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.

OSHA has granted an exemption for scientific diving from commercial diving regulations under the following guidelines (Appendix B to 29 CFR 1910 Subpart T):

A. The Dive Safety Board consists of a majority of active scientific divers and has autonomous and absolute authority over the scientific diving program's operation.
B. The purpose of the project using scientific diving is the advancement of science; therefore, information and data resulting from the project are non-proprietary.
C. 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.
D. 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.

1.3 Working Diving Standards

Diving activities not meeting the Scientific Diving definition must follow the OSHA Commercial Diving Standards outlined in 29 CFR 1910, Subpart T

A. OSHA standards to conduct working dives are described in Section 14
    I- If there is conflict between the standards in other sections of this manual, and those described in Section 14, the most restrictive will apply
B. In order to participate in working dives, divers must
    I- Be an active A&M-SA Scientific Diver fulfilling requirements described in Section 14
        i. Non-active Scientific Divers fulfilling the requirements described in Section 14 require special approval by the DSB

1.4 Operational Control

For the purposes of this manual, the auspices of A&M-SA include any diving operation in which A&M-SA is connected because of ownership of life support equipment used, locations selected, or relationship with the individual(s) concerned. This includes all cases involving the operations of individuals affiliated to the university or members of auxiliary organizations, where such individuals are acting within the scope of their authorization, and the operations of other persons who are engaged in diving activities of Texas A&M University - San Antonio.

The DSB must develop and maintain the Diving Standards for Underwater Operations that provides for the development and implementation of policies and procedures that will enable Texas A&M University - San Antonio to meet requirements of local environments and conditions, as well as to comply with the AAUS scientific diving standards.

1.5 Dive Safety Board

General

A. The Dive Safety Board (DSB), per OSHA CFR 1910, Subpart T, will exercise autonomous and absolute authority over all A&M-SA dive operations, and it is the ultimate authority of the A&M-SA Dive Program
B. The DSB is an appointed board of representatives of the responsible administrative officer or designee

Composition and qualifications

A. The Dive Safety Board (DSB) must consist of a majority of active scientific divers
B. Must include faculty representation, may include student body representation (undergraduate and/or graduate students), and external experts on scientific diving
C. Voting members include the Dive Safety Officer (DSO), and other representatives of the Dive Program
    I. Must consist of a majority of active scientific divers
        i. Voting members considered as active scientific divers must be active at the time of appointment, or qualify within 30 days
        ii. Voting members considered as active scientific divers must maintain

active status during the DSB membership

iii. To be registered as active scientific divers, external members must submit
   1. Be an active scientific diver at his home institution
   2. Copies of diving certifications

II. Must consist of a majority of A&M-SA representatives

III. Must have training on Risk Management and Liability on diving activities, or get trained within 30 days of appointment

D. May include non-voting members, appointed individuals that possess specific relevant expertise in an advisory capacity

E. DSB members must be familiar with the A&M-SA Diving Standards for Underwater Operations, or familiarize within 30 days of appointment

F. Will be chaired by the Dive Safety Officer
   I. The chairperson is a voting member

G. A secretary will be chosen by the Chairperson to assist the DSB administratively

Membership

A. The responsible administrative officer or designee, with the advice of the DSO, will annually appoint/reappoint additional voting members of the DSB

B. Any A&M-SA member can request in writing to the DSB Chairperson to be considered for membership

C. Membership for external experts can only be considered by the recommendation of a DSB voting member

D. Final approval to accept potential appointees will be approved by a DSB vote

E. The term of appointment for each DSB member is three years and aligns with the academic calendar (September 1st through August 31st the following calendar year)
   I. The DSO is a non-rotating member of the DSB
   II. It is preferred that no more than one member rotates off the DSB annually

F. Membership to the DSB due to non-performance can be revoked by unanimous vote of the DSB

Responsibilities

A. Establish, review, and revise the policies and procedures for diving activities conducted beneath the auspices of A&M-SA, as outlined on the Diving Standards

for Underwater Operations

B. Fulfill the requirements needed to apply for AAUS organizational membership
C. Approve and monitor all A&M-SA diving projects
D. Provide safety and compliance oversight for all A&M-SA diving activities
E. Ensure compliance of the A&M-SA diving community to the A&M-SA Diving Standards for Underwater Operations
F. Suspend diving operations considered to be unsafe or unwise
G. Investigate diving incidents within the Dive Program or violations of the diving safety manual
H. Establish and/or approve training programs through which applicants for dive status can satisfy the requirements of this manual
I. Recommend the issue, reissue, or the revocation of diving authorizations
J. Approve the depth to which a diver has been authorized to dive
K. Act as a board of appeal to consider diver-related problems
L. Recommend new equipment or techniques
M. Establish criteria for equipment selection and use
N. Establish and/or approve facilities for the inspection and maintenance of diving and associated equipment, including gas stations and quality standards
O. Act as the official representative of A&M-SA in matters concerning the diving program
P. Periodically review the DSO's performance and program
Q. The DSB may delegate operational control and oversight for portions of the Dive Program to the DSO, but the DSB retains ultimate responsibility for said execution

Meetings

A. Regular meetings are to be held at least quarterly
B. Special meetings, called at the discretion of the DSB Chairperson, will be held on an as-needed basis to address time sensitive issues
    I. Any voting member can recommend the need for a special meeting to the DSB Chairperson
    II. The date, location, and agenda of special meetings must be announced to all DSB members in a timely manner in accordance with the situation
    III. Regular quorum applies for special meetings

IV. Any voting member can request, through a Special vote, the issue to be discussed in the next regular meeting instead

C. Meetings can be in person or remotely
D. Special votes, called at the discretion of the DSB Chairperson, will be held electronically on an as-needed basis to address time sensitive issues
    I. Any voting member of the DSB can request the issue to be discussed on a meeting (regular or special) instead
    II. Any voting member can recommend the need for a special vote to the DSB Chairperson
    III. Resolution through special votes require majority from the voting members
    IV. Issues requiring special votes include, but are not limited to, approval of dive plans submitted by the DSO
E. A quorum of two-thirds of the voting members must be present, in person or remotely, to conduct official business
F. Decisions will be made by majority vote
    I. The Chairperson will cast the deciding vote in case of a tie
G. In the event that a voting member is part of an investigation process, such individual should not be present during the voting to ensure impartiality

1.6 Dive Safety Officer

Qualifications

A. Must be appointed by the responsible administrative officer or designee, with the advice and counsel of the DSB
B. Must be an active SCUBA instructor from an internationally recognized certifying agency
C. Must meet requirements set by AAUS for a Scientific Diving Instructor, and participate in the following AAUS DSO orientation meeting from the date hire
D. Must have a broad knowledge and experience on technical and scientific expertise in diving activities
    I. Must have ample experience on scientific diving activities, with at least 100 scientific dives utilizing a diversity of techniques and in a diverse range of environments

II. Preferably, should have experience on scientific diving activities led by different institutions

E. Must be familiar and experienced with all the diving equipment and techniques utilized at A&M-SA projects
   I. Must be able to get certified and/or have experience in diving equipment and techniques to be used by new A&M-SA projects
      i. This will be preferably done before the first dive plan requiring such equipment/techniques is submitted for approval
      ii. With approval from the DSB, this can be fulfilled with experience utilizing an analogous technique/equipment (i.e., different rebreather brand and/or model)
      iii. With approval from the DSB, this can be fulfilled by attending to the first dive trip utilizing such equipment/technique
      iv. If approval from the DSB is required (ii & iii), the DSO must submit in writing to the DSB how such approval would be consistent with safety standards
   II. In case the DSO is not able to get certified and/or experienced in a specific diving technology/technique utilized at A&M-SA projects the DSO will need to notify in writing
      i. The reasons why they cannot get certified and/or obtain experience. Following best practice in diving, personal limits are an acceptable reason.
      ii. A list of A&M-SA or external experienced divers in such technology/technique that can help co-review the dive plans requiring it
F. Preferably, will have experience in the complete cycle involving underwater scientific activities, including, but not limited to: project conceptualization, data gathering, data analysis, drafting scientific publications, scientific communication, and science outreach

Duties and responsibilities

A. Will serve as Chairman of the DSB, and as such, will prepare recommendations for

consideration by the DSB

I. If multiple DSOs are appointed
    i. The DSB will designate through a vote, the Chairman of the DSB
    ii. The Chairman of the DSB and the DSO in charge of Scientific Diving activities should be different persons

B. Will be responsible, although guided in the performance of the required duties by the advice of the DSB, for the conduct of the A&M-SA 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 and AAUS standards, and all relevant regulations, rests with the DSO
C. May permit some duties and responsibilities to be carried out by a qualified delegate, with the approval of the DSB
D. Answers, through the DSB, to the appropriate administrative officer or designee, for the conduct of the A&M-SA Dive Program
E. Maintain active status as Scientific Diver, Scientific Diver Instructor, and Diving instructor
    I. In order to maintain active status as Scientific Diver, the DSO must participate in at least six scientific dives per year
        i. Instructional dives during a scientific diving course do not count as scientific dives
F. Maintain current on diving safety standards, best practices, technology, and techniques
G. Support A&M-SA projects utilizing diving techniques, from the proposal to the field stage on subjects directly relating with diving activities
H. Has the authority to suspend diving operations determined to be unsafe or unwise
I. In the event of a standards violation (non-compliance) or safety issue related to diving
    I. Communicate non-compliance to the DSB
    II. Lead the investigation and prepare an incident report for the DSB
J. Promote the A&M-SA dive program
K. Collaborate and promote safe diving practices with other institutions utilizing

scientific diving

L. Will be designated as an A&M-SA representative to AAUS during the Organizational membership application
M. Must attend an AAUS DSO Orientation meeting within one year of accepting a position, or have served as a DSO for another current AAUS Organizational Member within the previous 12 months of hire
N. Must attend an AAUS DSO Orientation meeting at no less than 5-years intervals

Provisions in the absence of a DSO

A. During temporal absences of the DSO
    I. The DSO will propose a qualified delegate for responsibilities non-related with the safe conduct of the diving program, such responsibilities will be carried out by the DSB
    II. The DSB will decide if any activity should be suspended during the absence of the DSO
    III. DSO delegate needs to be approved by the DSB
B. In case the DSO position is vacant
    I. The DSB interim Chairperson will be the DSB member with the most experience on scientific activities
    II. The DSB will decide which activities from the A&M-SA dive program need to be suspended until the appointment of a new DSO
    III. Considering the qualifications required for the DSO position, and with the approval from the responsible administrative officer or designee, may appoint an interim DSO from a member of the A&M-SA dive program
    IV. With the approval from the responsible administrative officer or designee, the DSB will be appointed as the DSO search committee
    V. The DSB interim Chairperson will be designated as an A&M-SA representative to AAUS
        i. Will inform AAUS on the changes of the DSB, steps ahead, and tentative timelines

1.7 Instructional Personnel Qualifications

A. All personnel and non-university personnel involved in diving instruction, training, and operational oversight under the auspices of A&M-SA will:
   I. Be qualified for the position
   II. Instruct under the standards of an internationally recognized dive training agency or under the minimum guidelines presented by the most current version of the ISO, WRSTC, RESA, and/or CMAS
   III. Be screened and authorized by the DSB prior to service
B. For university personnel who will be instructor-of record and teach a class at the university as part of the A&M-SA Dive Program
   I. Credentialing ultimately rests with the Dean and individual Department Heads

Selection of University personnel

Department Heads are advised to contact the DSB when existing faculty, or during instructional personnel searches, involving teaching current or new courses involving SCUBA diving techniques and/or technologies in order to verify the potential instructor has the certification and qualification to teach a course from an internationally recognized training agency. The DSB will then initiate the DSB Screening Process to verify the certifications and qualifications of the candidate.

The role of the DSB is to evaluate if existing faculty or new candidates have the necessary instructor qualifications and certifications for their potential teaching activities or provide with an assessment including the steps required for approval.

1.8 Instructor Assistants or Divemaster

A. All Instructor Assistants participating at university courses and activities
   I. Are certified as SCUBA Instructor, Training Assistant, or Divemaster by an internationally recognized training agency
   II. Must be approved by the DSO to act as Instructor Assistant for the specific course(s)
   III. May assist with recreational and scientific diving courses to provide instructional support and safety oversight under the guidelines specified by

the certifying agency for the specific course(s)

i. To assist with scientific diving courses, it is preferred that the Instructor Assistant also hold a Scientific Diving Instructor or Scientific Diver certification

IV. May supervise or assist recreational activities for divers participating in university organized events

Requirements for personnel qualified to act as Instructor Assistant

A. For university personnel and A&M-SA students
   I. Registered and active in the university Dive Program
   II. Approval by the DSO to act as Instructor Assistant
   III. Diving professional liability insurance policy
      i. This can be fulfilled by been part of the university insurance policy or with a personal and current insurance policy
B. For non-university personnel
   I. Submit copies of relevant diving certifications
   II. Complete the Release of Liability, Waiver of Rights, and Indemnification Agreement (Appendix 2)
   III. Valid diving insurance (e.g., DAN's Master level or above insurance or equivalent)
   IV. Must have diving professional liability insurance policy
      i. Not required for activities abroad at a country where diving liability insurance is not available or required
      ii. An A&M-SA professional diver must be in charge of the activity
      iii. Requires approval by the DSB

1.9 Lead Diver

For each dive, one individual must be designated as the *Lead Diver* who must be at the dive location during the diving operation. The Lead Diver is responsible for:

A. Preparing and submitting the Dive Plan to the DSO
B. Distributing the approved dive plan to all the dive team members
C. Ensuring all dive team members possess current authorization and are qualified for

the type of diving operation

D. Ensuring dives are conducted in accordance with the A&M-SA Diving Standards for Underwater Operations
E. Coordination with other known activities in the vicinity that are likely to interfere with diving operations
F. Ensuring safety and emergency equipment is in working order and available at the dive site
G. Has the authority in the field to suspend diving operations if in their opinion are unsafe or unwise
H. In the event of a physical or physiological incident: ensure care for victim first (follow emergency planning procedures), then immediately report in writing to the DSO to initiate the Post-Incident Analysis by the DSB
I. Selection of the Lead Diver by the dive/research team should consider overall diving experience, but also experience in the environment, techniques/equipment required, in the task to be performed, and at the specific site
    I. With the authorization of the DSO, the Lead Diver can designate some or all of the tasks (A-H) to another member of the dive team as part of their professional development, however, the Lead Diver will have the full responsibility for all the tasks.
    II. The DSB and DSO have the authority to change the Lead Diver selected by the dive/research team

1.10 Reciprocity and Visiting Scientific Divers

When A&M-SA engages jointly in diving activities, or engages jointly in the use of diving resources with other Organizations/Facilities

With organizations with a Scientific Diving Program

A. AAUS organizational members, US Federal or State Agency with a scientific diving program (e.g., USGS), or international institution with a) Dive Safety Board AND b) Dive manual
B. One of the participating DSBs will be designated to govern the joint dive project.
C. Responsibility for individual divers ultimately resides with the home institution
    I. A&M-SA Scientific divers must submit the approved dive plan of the host

institution for approval of the A&M-SA DSB/DSO, as applicable (see 2.9)

D. Scientific Diver(s) from another Organization/Facility must apply for permission to dive under the auspices of A&M-SA
   I. Submit to the DSO the Request for diving Reciprocity Form, Verification of Diver Training and Experience (Appendix 8)
      i. Must be signed by the DSO or Chair of their home DSB
      ii. An equivalent form from their home DSB may fulfill this requirement
   II. Complete the Release of Liability, Waiver of Rights, and Indemnification Agreement (Appendix 2)
E. A visiting Scientific Diver may be asked to
   I. Provide further documentation required by the DSO or DSB
   II. Demonstrate their knowledge and skills for the planned dive
F. If the permission to dive is denied or diving restrictions are applied
   I. The DSO must notify the visiting Scientific Diver and their DSB with an explanation of all reasons for the denial.

Organizations without a Scientific Diving Program

A. Visiting Scientific Divers from organizations without a Scientific Diving Program or not fulfilling the requirements outlined under 1.9 *With Organizations with a Scientific Diving Program "A"*
   I. Need a Temporary Diver Authorization
   II. An A&M-SA active Scientific Diver must submit the following to the DSB
      i. Petition in writing identifying the potential candidate(s) for a Temporary Diver Permit, and their professional affiliation
      ii. General prerequisites described in 2.3 *Administrative* A.I & A.II.i
      iii. Diving certification cards from an internationally recognized training agency appropriate to the diving activities to be conducted
      iv. Evidence of diving insurance (e.g., DAN's Master level or above insurance; or equivalent)
      v. Evidence of the diver's experience in accordance with the diving activities to be conducted

1. Dive logs (most recent dives / dives related to proposed diving activities) in paper or digital (including the candidate's dive computer)
2. Active status as a dive professional with an internationally recognized training agency

III. If approved by the DSB, a written Temporary Scientific Diver authorization will be issued that will include, at a minimum
   i. The diver's name
   ii. Dates of authorization
   iii. Site(s) where authorization is valid
   iv. Depth rating authorized

IV. Prior to the start of diving operations, the diver must complete the Release of Liability, Waiver of Rights, and Indemnification Agreement (Appendix 2)

V. Duration of a Temporary Diver Authorization will be project dependent. Maximum duration will be the shorter of the following
   i. 12 months
   ii. Expiration date of the diving insurance coverage
   iii. Can be renewed by providing A.II.iii-iv

B. A&M-SA divers participating in scientific diving activities without a Scientific Diving Program or not fulfilling the requirements outlined under 1.9 *With Organizations with a Scientific Diving Program "A"* must submit:

I. Dive Plan for evaluation/approval by the DSB

II. Confirm that an Emergency Oxygen Kit will be available on site
   i. If this cannot be confirmed before the start of the trip, A&M-SA divers are advised to carry one
   ii. A&M-SA divers will not be allowed to conduct diving activities if an Emergency Oxygen Kit is not available on site

III. The following documents from the dive buddy(ies)
   i. Submit copies of relevant diving certifications
   ii. Complete the Release of Liability, Waiver of Rights, and Indemnification Agreement (Appendix 2)
   iii. Valid diving insurance (e.g., DAN's Master level or above insurance or equivalent)

IV. Letter by the A&M-SA diver to the DSB stating that they will adhere to the A&M-SA Diving Standards for Underwater Operations
V. For projects in the US, or hosted by an US organization, the diver will need to provide evidence that all diving activities will follow OSHA standards for SCUBA diving
    i. Permit to dive will be automatically denied by the DSB unless indisputable evidence is provided

1.11 External Diver Volunteers

A. External Diver Volunteers are qualified individuals who are not affiliated with A&M-SA, and are not eligible to obtain a Reciprocity Form, Verification of Diver Training and Experience
    I. External Diver Volunteers cannot be affiliated with A&M-SA or an AAUS organization member since they are considered AAUS Scientific Divers
B. If any or all the following conditions are met, the diver must apply for A&M-SA Temporary Diver Authorization
    I. Is going to receive compensation by the university/project
    II. Is going to use university owned equipment
    III. Is going to obtain data/samples to be used for scientific purposes
C. They are not performing scientific activities, but can act as an A&M-SA dive buddy / safety diver performing scientific activities
D. External Diver Volunteers must provide the following
    I. Copies of relevant diving certifications
    II. Complete the Release of Liability, Waiver of Rights, and Indemnification Agreement (Appendix 2)
    III. Valid diving insurance (e.g., DAN's Master level or above insurance or equivalent)
    IV. Minimum experience, which can be demonstrated with one of the following
        i. Certified as a Dive Professional (i.e., SCUBA instructor, Divemaster) by an International recognized training agency
        ii. Minimum of 30 logged dives, with at least 2 dives in the previous six months, or 6 dives in the previous 12 months

iii. If the proposed dives require technical diving techniques, minimum experience can be demonstrated with one of the following
   1. Certified as a Dive Professional to the type of diving to be performed by an International recognized training agency
   2. Minimum of 100 logged dives, with at least 10 dives similar to those to be performed, with at least 2 dives in the previous six months, or 6 dives in the previous 12 months

E. External Diver Volunteers must be approved by the DSO before the start of diving activities

1.12 Waiver of Requirements

A. The DSB may grant a waiver for specific requirements of training, examinations, depth authorizations, and minimum activity to maintain dive status. AAUS medical standards may not be waived.
B. Individual or the DSO must submit a written request, including a justification for the waiver, to the DSB
   I. Request submitted by the DSO may be discussed through a DSB Special vote
   II. Request submitted by individuals will be discussed during the following DSB scheduled meeting
      i. The individual may request to attend the meeting to participate in the discussion, but may not be present during the vote
C. Requirements waived at least two times must be discussed during the following DSB regular meeting to consider changes in the A&M-SA Diving Standards for Underwater Operations

1.13 Consequences of Violations of Regulations by Scientific Divers

Failure to comply with the regulations of the A&M-SA Diving Standards for Underwater Operations may be cause for the restriction, suspension, or revocation of the diving authorization by action of the DSB

1.14 Record Maintenance

A. The DSO must maintain consistent records of the A&M-SA Dive Program and for each Scientific Diver. Records include, but are not limited to:

I. Diving safety manual
II. Equipment inspection, testing, and maintenance
III. Approved dive plans
IV. Records of dive
V. Medical approval to dive
VI. Diver training records
VII. Diver authorization(s)
VIII. Individual dive log
IX. Dive incident reports
X. Reports of disciplinary actions by the DSB
XI. Other pertinent information deemed necessary by the A&M-SA

B. Each Scientific Diver is responsible for ensuring that the applicable paperwork outlined below is present and current in their Individual Diver File
   I. All diving certifications, authorizations, and scientific diving depth rating
   II. Training records
   III. Results from current diving physical (Appendix 5 & 5b)
   IV. Dive log
   V. Current First Aid, CPR and O2 provider certifications
   VI. Current Diving Insurance
   VII. Diving Program Application (Appendix 1)
   VIII. Release of Liability, Waiver of Rights, and Indemnification Agreement (Appendix 2)
   IX. Any other document required by the DSO/DSB
   X. University waiver(s)
   XI. Report(s) of any diving-related disciplinary actions at A&M-SA
C. For recreational and technical diving courses
   I. Instructors will maintain students' files on all individuals participating in diver training and certification activities
   II. Students' files must follow the standards by the diving certification agency selected for the course and those described on 2.3 *Administrative*
      i. The University, DSB, or DSO may make additional requirements
   III. Original records will be placed on file in the A&M-SA Dive Program as soon as practical after the completion of training

D. Records may be maintained in electronic or physical form

Availability of records of the A&M-SA Dive Program

I. Medical records must be available to an attending physician of a diver or former diver when released in writing by the diver (Appendix 5b)
II. Upon request of the Occupational Safety and Health Administration (OSHA), State Office of Risk Management, AAUS or any affiliated diver-training agency A&M-SA will make available for inspection and copying any record or document required by the OSHA or training agency standards, except medical records
III. Records and documents required must be retained for the following period
    a. Diving safety manual – Current document only, except 5 years where there has been an incident of pressure-related injury
    b. Equipment inspection, testing, and maintenance records – Minimum current entry or tag
    c. Records of Dive – minimum of 1 year, except 5 years where there has been an incident of pressure-related injury
    d. Medical approval to dive – Minimum of 1 year past the expiration of the current document except 5 years where there has been an incident of pressure-related injury
    e. Scientific Diver training records – Minimum of 1 year beyond the life of the diver's program participation
    f. Recreational or technical diver training - Minimum of 7 years
    g. Diver authorization(s) – Minimum of 1 year beyond the life of the diver's program participation
    h. Pressure-related injury assessment - 5 years
    i. Reports of disciplinary actions by the DSB – Minimum of 1 year beyond the life of the diver's program participation
IV. Records and documents containing confidential and protected information may be disposed of according to accepted University policies and procedures for the disposal of protected/confidential information after the periods described above

Termination of the A&M-SA Dive Program

In the event the Texas A&M-SA Dive Program ceases to exist, all applicable records maintained under the requirements of this section must be transferred to the

administrative office responsible for DSB appointment for continued maintenance for a minimum period as outlined on 1.13 "Availability of Records of the A&M-SA Dive Program" or 5 years, and its proper disposition.

1.15 A&M-SA Employees 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

Section 2. DIVING REGULATIONS

2.1 Introduction

No person should engage in diving operations under the auspices of the A&M-SA Dive Program unless they are authorized pursuant to the provisions of the Diving Standards for Underwater Operations

2.2 Safety Statement: The decision to dive is that of the diver

The ultimate responsibility for safety rests with the individual diver. It is the diver's responsibility and duty to refuse to dive, without fear of penalty, if in the diver judgment, conditions are unsafe or unfavorable, or if they would be violating the precepts of their training or the A&M-SA Diving Standards for Underwater Operations

No dive team member will be required to be exposed to hyperbaric conditions against the diver's will

No dive team member may dive for the duration of any known condition that is likely to adversely affect the safety and health of the diver or other dive team members

2.3 General Prerequisites

Administrative

Participants at any university diving activities, including those organized as or through an A&M-SA student organization, must complete all administrative and legal documentation required by A&M-SA Dive Program, including:

A. All participants
   - I- Complete the Release of Liability, Waiver of Rights, and Indemnification Agreement (Appendix 2)
   - II- Current medical form
     - i. In accordance with latest recommendations and standards of the internationally recognized training agency for the course being instructed, OR in accordance with standards outlined by the World Recreational Scuba Diving Training Council (WRSTC) or ISO (e.g. Appendix 9)

ii. WRSTC and ISO medical forms are valid for 12 months
iii. For Scientific Divers, see Section 5

III- Any other document required by the diving agency certifying the instructor status of the DSO or approved A&M-SA Diving Instructor

IV- Courses seeking technical diving or professional diving certifications require an acceptance letter from the Instructor prior to registration

B. The following are required for all divers, other than uncertified participants of a "Discover SCUBA" event, or enrolled in a university course that includes Entry Level Diver Certification

I- Complete the *Diving Program Application* (Appendix 1)

II- Valid diving insurance (e.g., DAN's Master level or above insurance; or equivalent)

III- Diver certification cards accordingly to type of diving

2.4 Diving Procedures

Emergency procedures and deviations from regulations

Any diver may deviate from the requirements of the A&M-SA Diving Standards for Underwater Operations to the extent necessary to prevent or minimize a situation likely to cause death, serious physical harm, or major environmental damage. A written report must be submitted to the DSB explaining the circumstances and justifications

Emergency procedures are detailed in Appendix 6b & 6c. Dive teams must have a printed copy available on site, it is recommended that it is printed on waterproof paper or laminated it.

Decompression management

A. On any given dive, both divers in the buddy pair must follow the most conservative dive profile

I- During dives planned within no decompression limits, divers utilizing more than one dive computer must follow the most conservative profile

II- During decompression dives, divers utilizing more than one dive computer with different conservative settings must clearly state to the dive buddy which is going to be considered the main computer

B. If a dive computer requires decompression stops during dives planned within no

decompression limits

I- The dive buddy must follow the most conservative dive profile

II- The diver exceeding no decompression limits must communicate it to the Lead Diver

i. The diver will not be allowed to dive for the rest of the day

ii. At the discretion of the Lead Diver, diving privileges may be temporarily revoked or restricted

C. A safety stop performed during the ascent phase of the dive should be conducted on any dive that exceeds 30 feet (9 m)

Dives under multiple modes

Divers must follow the minimum standards and most conservative guidelines delineated for each diving mode (e.g., decompression cave dives must follow standards for BOTH cave and decompression)

Number of dives and oxygen exposure

A. A maximum number of open water dives per day, if at least one of the dives is in excess of 2 ATA, including those conducted during courses seeking a certification are

I- Four recreational dives

II- Three Scientific dives

B. Unless approved by the DSB, dive plans must include a day without diving operations after six days of consecutive dives

I- Mandatory day of rest can be scheduled at different days per diver, as long as no diver conducts diving operations for more than six consecutive days

II- Dive teams can be assigned as surface support or safety divers (not diving, but with their equipment ready in case of an emergency) during their mandatory day of rest

C. Maximum Operating Depth (MOD) per a given gas mixture will be determined by a working ppO_2 of 1.4, or a resting ppO_2 of 1.6

I- Exposure of up to ppO_2 of 1.6 may be approved by the DSB for operations with light tasks and conducted on open water environments

D. Maximum O_2 exposure may not exceed the NOAA maximum recommended limits to the Central Nervous System (CNS) and pulmonary exposure

Procedures on diving operations utilizing vessels

A. Topside support must consist of at least two individuals, including the captain, during diving operations
   I- It is recommended that at least one individual serving as topside support has a current medical first responder certification as described on 4.2 *Administrative* E.
   II- Operations on small vessels, up to 30 feet, require a single individual if there are at least four divers

2.5 Mixed teams

Dive teams with divers utilizing different diving techniques/technologies (e.g., backmount doubles, sidemount, rebreathers) must

B. Divers must be briefed on
   I- Gas sharing procedures
   II- Basic system operations for establishing positive buoyancy
   III- Bailout procedures
   IV- Differences on how to identify and respond to an emergency (e.g., describing what to look for during the bubble check, specific warning signals from the dive computer)
C. Gas planning must consider enough reserve gas to allow gas sharing in case of an emergency
   I- Divers using a rebreather must have bailout gas compatible with open circuit diver's decompression plans
D. Divers on Mixed Teams must complete a safety drill, including gas sharing, before the first scientific dive
E. Divers may refuse to dive in a mix team, without fear of penalty

2.6 Reserve Gas Supply System

A. A diver-carried Reserve breathing Gas Supply (RGS; also known as Reserve Air Supply System - RASS) consisting of an independent reserve cylinder with a separate regulator must be worn by each diver in the following cases

I- When diving outside the no-decompression limits
II- In overhead environments where direct ascent to the surface is prevented
    i. Reserve supply is not required during recreational dives within the cavern zone, as defined by internationally recognized diving agencies
III- In enclosed or physically confined spaces
IV- In low visibility where the diver cannot read their gauges
V- Deeper than 130 feet (40 m)
VI- When deemed appropriate by the DSO or Lead Diver

B. The reserve supply must be of sufficient duration to allow the diver
    I- Reach the surface while maintaining an ascent rate of 30 feet per minute
    II- Perform all planned decompression stops
    III- Or reach a stage/decompression cylinder
C. The reserve supply must comply with the following characteristics
    I- The cylinder valve must not be blocked and be easily accessible
    II- The diver must be able to easily read the cylinder pressure, either with a
        i. HP gauge with high-pressure hose of sufficient length to allow the diver to easily read the HP gauge
        ii. Air Integration Transmitter and compatible dive computer
    III- 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.
    IV- If a longer hose is used for the second stage, it must be either be:
        i. Stored where it can be accessed easily, or
        ii. Fastened with a proven quick release mechanism (octo-holder, necklace, etc.)
    V- 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
    VI- Be kept closed until needed, to prevent accidental loss of breathing gas
    VII- 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
    VIII- Contain an appropriate breathing gas mixture to accommodate the mode of diving and depth requirements of the dive operation

IX- 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

D. Use of multiple tanks that are independent (i.e., sidemount configuration), or can be isolated in the case of an emergency (i.e., set of manifolded doubles with isolation valve) meet this requirement

2.7 Solo Diving Prohibition

All diving activities must assure adherence to the buddy system. The dive buddy system is based upon mutual assistance, especially in the case of an emergency

Separation during a dive

If separated during a dive, divers must try to re-establish contact for no more than one (1) minute and if unsuccessful, immediately begin a controlled ascent to the surface, omitting a safety stop. Upon surfacing and reuniting with their buddy, the buddy pair can choose to resume the dive, provided there is sufficient remaining breathing gas and allowable bottom time

2.8 Discover SCUBA activities

The DSO and instructional personnel (1.5-1.6) may conduct Discover SCUBA (also known as "Try-SCUBA") activities under the auspices of the university, with prior authorization by the DSB

C. Discover SCUBA activities are designed to give non-certified divers an introduction to diving in a controlled environment under the direct control and supervision of an active dive professional

D. Discover SCUBA activities also offer certified divers an introduction to diving equipment for which they do not hold a certification (e.g., rebreather) under the direct control and supervision of an active dive professional

E. Discover SCUBA activities d**oes not result in a diving certification**

F. Discover SCUBA activities cannot be led by a certified instructor assistant or Divemaster (see 1.7)

G. Discover SCUBA activities will only be authorized if there is a clear objective to

promote safe diving practices, the university, and the A&M-SA Dive Program

H. The DSO and Instructional personnel will only have one non-certified person at the time while using diving equipment
    I- A second non-certified person is allowed with the presence of a certified Instructor assistant or Divemaster
I. Non-certified divers may never be left unattended by the DSO or Instructor in the water
J. The DSO and Instructional personnel must follow the standards of the internationally recognized training agency
    I- If there is conflict between the standards in this manual, and those from the training agency, the most restrictive will apply
K. Dive plans to conduct Discover SCUBA activities must be approved by the DSB
    I- All participants must fulfill the General Prerequisites (2.3)

2.9 Dive Plans

Before conducting any diving operations under the auspices of A&M-SA, a dive plan for the proposed project or dive must be submitted and approved by the DSO or DSB

A. Dive Plans must be submitted utilizing the Dive Plan Proposal form (Appendix 6)
    I- This form may be modified to suit the specific operational requirements
B. Dives should be planned around the competency of the least experienced diver per dive team
C. Dive Plans must include the following
    I- Basic information
        i. Name and contact information of the Lead Diver
        ii. Project or activity name
    II- Information on dive team members including
        i. Applicable certifications
        ii. Depth rating/authorization in accordance with the classification of diving activities
        iii. Dive insurance information
        iv. Diver phone
        v. If the diver is going to use personal equipment
    III-General information of the diving activities

i. Classification of diving activities
ii. Diver's affiliation
iii. Proposed dates and locations
iv. Approximate number of proposed dives

IV- Dive Plan including
i. Dive platform(s)
ii. Environments
iii. Diving Mode(s) and Gas(es)
iv. Maximum depth
v. Maximum number of dives and minimum surface intervals
vi. Dive profiles, including:
1. Maximum depth(s) and bottom time
2. Gas management plan
3. Entry, exit, descent, and ascent procedures
4. Estimated depth(s) and bottom time(s) anticipated
5. Decompression status and repetitive dive plans, if required
vii. Proposed work, including:
1. Diving Buddy assignments and tasks
2. Goals and objectives
3. Specialized equipment

V- Diving risk assessment and mitigation plans
i. Any hazardous conditions anticipated
ii. Mitigation measures

VI- Emergency Action Plan
i. Emergency equipment availability
ii. In water emergency and diver recall procedures
iii. General procedures at the surface
iv. Emergency contacts

D. Dives requiring technical diving techniques, or deemed as complex operations by the DSO/DSB must include at least one Risk Assessment following the NOAA GAR Model for Operational Risk Management (NOAA Form 57-03-30, page 2)

I- The GAR Risk assessment can be conducted by the lead diver
i. The DSO may require it to be conducted by the full dive team

ii. The DSO may require a re-assessment during field operations

II- Include the full table as supplemental information during the dive plan submission

III- Operations with GAR Model color "RED" or scores on one category ≥ 8, or two categories ≥7, regardless of total score, require approval from the DSB

E. It is the responsibility of the Lead diver to distribute the approved dive plan to all the dive team members

I- A printed copy must be available on-site during field operations

Submission and approval process

A. Dive plans must be submitted by the Lead Diver to the DSO/DSB at least 10 business days before the proposed diving activities

I- Dive plans can be submitted either as a PDF or word document to DiveSafetyBoard@tamusa.edu

II- Business days include A&M-SA approved holidays and breaks for university staff

III- Late submissions may delay or prevent its approval

IV- It is recommended that the Lead Diver work with the DSO in the preparation of their first dive plan on projects requiring technical/complex diving operations

V- It is recommended that the Lead Diver or PI notify the DSO of a project requiring a late submission as soon as possible

B. Dive plans can be reviewed and approved by the DSO if

I- The DSO is not the Lead Diver

II- The DSO is certified and has experience conducting the type of proposed dives

III- Maximum depth does not exceed 190 feet (48 m)

IV- The dive plan does not include Discover SCUBA activities

V- The DSO may request DSB approval for any specific Dive Plan

VI- The dive plan is similar to a previously approved dive plan by the DSB, and it has been submitted by the same Lead Diver, including the DSO

i. Dive plans can not involve operations with higher complexity/risk, or require a deeper maximum depth to be considered as similar dive plans

ii. The DSO will notify in a timely manner to the DSB of a dive plan approved based on similarity to a previously approved dive plan
iii. Any DSB voting member may request the dive plan to be evaluated by the DSB

C. Dive plans requiring approval by the DSB
   I- May be approved through an electronic special vote
      i. Any DSB member may require the Dive Plan to be discussed at meeting
      ii. The DSB may request consultation by an external qualified and experienced diver in the type of proposed dives
   II- May take longer than 10, but not more than 20, business days to be approved
D. Dive plans may be pre-approved pending further documentation (i.e., signature of waiver forms by non-A&M-SA divers)
   I- Remarks, conditions, or restrictions will be included in the Dive Plan form (Appendix 6)
   II- Restrictions may be on the entire dive plan, or on individual divers
   III- Diving operations, by the entire dive team or individual diver, under restrictions may not start until such restriction(s) are fulfilled
E. Rejected dive plans by the DSO may be submitted for consideration to the DSB
F. DSB decisions are final
G. Re-submission of a dive plan after revisions will be considered as a new submission
H. The DSO/DSB may reject changes or cancel the prior approval of the Dive Plan

Changes in approved dive plans

It is expected that field operations, especially those related with scientific activities, require some flexibility. It is advisable that expected required flexibility by a project is considered during the preparation of a dive plan

A. All changes must be notified to the DSO by the Lead Diver
   I- Changes in dive plans approved by the DSB must be notified to the DSB
B. All changes increasing the risk or complexity of a dive are considered major changes and must be pre-approved by the DSO before they are applied
   I- Sections of a dive plan not affected by major changes will remain approved
   II- Definition of the type of change (major/minor) should consider the competency of the least experienced affected diver by the change

III- All changes must be pre-approved by the DSO if the Lead Diver is an undergraduate student, unless the Lead Diver is registered as an Instructor Assistant in the A&M-SA Dive Program (see 1.7)

IV- Major changes include, but are not limited to

i. Less conservative dive profiles
ii. Classification of diving activities
iii. Dive locations with different conditions
iv. Environment
v. Anything requiring a Waiver of Requirements

C. Minor changes by the Lead Diver before the start of diving operations will remain approved unless it is notified otherwise by the DSO

I- The Lead Diver must notify the DSO and the dive team members of the changes as soon as possible

i. Notification must include if the Lead Diver consider the changes to be minor or major
ii. It is responsibility of each diver to notify the DSO if they consider that the changes should not be considered minor changes

D. Minor changes by the Lead Diver during diving operations

I- All dive team members must agree that the changes can be considered minor
II- The Lead Diver must notify the DSO of the changes as soon as possible

2.10 Field Pre-Dive Procedures

Pre-dive safety checks

A. Prior to commencing the dive, the team must assure that every team member is healthy, fit, and trained for the type of dive that is being attempted

I- No dive team member should be permitted to dive when afflicted by any condition known to jeopardize any diver's health or safety

B. If using breathing gas other than air,

I- Each diver must analyze their gases accordingly, for example

i. Nitrox – Analyze Oxygen content
ii. Trimix – Analyze Oxygen and Helium content

II- Each diver must calculate as appropriate,

i. Maximum operating depth (MOD) - Nitrox
ii. Equivalent Narcotic Depth (END) – Nitrox and Trimix

III- Each diver must re-evaluate the dive plan and mark the cylinders that they will personally use. Personal labels in the tank will include at least
i. Diver's initials
ii. Gas content
iii. MOD
iv. Date

C. Divers must conduct a functional check of their diving equipment in the presence of the dive buddy or tender
D. Each diver must have the capability of achieving and maintaining positive buoyancy at the surface
E. Environmental conditions and detailed site evaluation will be assessed prior to the start of diving operations

Pre-dive briefings

A. Prior to any diving operations, the dive team members must be briefed on
I- Dive Buddy assignments and tasks to be undertaken
II- Dive profile including entry, exit, descent, and ascent procedures
III- Gas management procedures
IV- Perceived environmental and operational hazards and mitigations
V- Emergency and diver recall procedures, including the location of safety and communication equipment

B. If surface support is available, they must be briefed on
I- Task to be undertaken
II- Total dive time (surface to surface) and procedure if the time is exceeded
III- Perceived environmental and operational hazards and mitigations
IV- Emergency and diver recall procedures, including the location of safety and communication equipment

Drugs and alcohol

A. If a condition exist for which prescription drugs are needed and prescribed, clearance from a physician with knowledge of undersea and hyperbaric medicine may be required

I- During field operations
   i. The consult may be in person or remotely (i.e., calling the DAN non-emergency number)
   ii. The diver must communicate it to the DSO

B. No diving or hyperbaric exposure is permitted under the influence of alcohol or within 12 hours of the last consumption of alcohol
C. Divers in possession of any recreational drugs during field operations will have all diving privileges temporary revoked
D. Divers using any prescription drug not declared in their medical record and cleared by a physician during field operations will have all diving privileges temporary revoked

2.11 Termination of the Dive

A. Any dive must be terminated
   I- While there is still sufficient cylinder pressure to permit the diver to safely reach the surface, including decompression time, or to safely reach an additional air source at the decompression station
   II- A diver request termination
   III- A diver fails to respond correctly to communication or signals from a team member
   IV- A diver begins to use their Reserve Gas Supply System
B. It is the responsibility of the diver to terminate the dive that they consider unsafe, without fear of reprisal, in a way that does not compromise the safety of another diver already in the water

2.12 Post-Dive Procedures

Post-dive safety checks

A. After the completion of a dive, each diver must report any physical problems, symptoms of decompression sickness, or equipment malfunctions to the Lead Diver, DSO, and/or DSB
B. When diving outside the no-decompression limits, the divers should remain awake, and in the company of a dive team member, for at least 1 hour after diving

C. At the completion of each dive, the Lead Diver or Primary Investigator must ensure that a by name roll call and diver status check is conducted to account for all divers

Flying after diving or ascending to altitude (Over 1000 feet/300 meters)

A. Divers must have the following minimum preflight surface interval
   I- 12 hours following a single no-decompression dive
   II- 18 hours following multiple dives per day or multiple days of diving
   III- 24 hours following dives requiring decompression stops
B. Divers with DCS symptoms are not allowed to fly unless cleared by physician with knowledge of hyperbaric medicine or specialized personnel (i.e., DAN) during an emergency
C. Before ascending to altitude above 1000 feet (300 meters) divers should follow the appropriate guideline (A) for preflight surface intervals unless the decompression procedure used has accounted for the increase in elevation

Personal diving log requirements

A. All A&M-SA divers must log every dive made under the A&M-SA Dive Program, including training dives on confined waters
   I- A&M-SA divers are encouraged to log all other dives
B. All dive logs must be submitted to the DSO in excel format (Appendix 7)
C. Dive logs must include necessary information as required by AAUS, and should include at least the following
   I- Name of diver, dive buddy, and Lead Diver
   II- Date, time, and location
   III- Classification of diving activities (e.g., Scientific, training)
   IV- Diving modes used (e.g., OC, CC)
   V- Gases used
   VI- Diving tables or computers used
   VII- Maximum depth, total dive time, surface interval
   VIII- General nature of diving activities
   IX- Detailed report of any near or actual incidents
D. Dive logs from activities made under the A&M-SA Dive Program must be submitted within the following month of the end of the diving operations / fieldtrip

I- Failure to submit dive logs may temporary suspension of privileges to continue diving

2.13 Required Incident Reporting

All diving incidents and accidents requiring recompression treatment, or resulting in moderate or serious injury, or death must be reported immediately or as soon as possible, no later than 72 hours of the incident, to the DSB. A&M-SA will report all illnesses and accidents in accordance with requirements of the appropriate Labor Code section

A. The Lead Diver or PI will notify immediately or as soon as possible the DSO of any diving incident and accident
B. The Lead Diver or PI then, will have up to 72 hours of the incident to submit a full report of the accident to the DSO
   I- Written reports must include:
      i. Name, address, phone numbers of all parties involved
      ii. Location, description of dive site, and description of conditions that led up to the incident
      iii. The circumstances of the incident and the extent of any injuries or illnesses
      iv. Description of symptoms, including depth and time of onset
      v. Description and results of treatment
      vi. Recommendations by the Dive Team to avoid repetition of similar incidents
      vii. Any waivers, releases, or statements of understanding signed by victim.
      viii. If the accident took place during training or working phase, copies of pertinent records of training
      ix. Name, date, and signature of the person making the report
   II- Examples of other information that may be included in the report are:
      i. Log including details of the accident, state of the victim(s), response actions conducted
      ii. Copy of victim's and dive buddy dive logs
      iii. List of all diving equipment of the victim, with information as it applies (brand, model, amount of weight, etc.)
      iv. Photographs and videos of the diving operations, diving equipment

used, and during the accident response

v. Witness statements
    1. If witness statements are taken, they will only provide facts, no opinions
    2. Have witness date and sign each page of statement

III-The report and all the material are confidential

C. The DSO will notify immediately to the DSB of any diving incident and accident, and will make available to the DSB the full report submitted by the Lead Diver or PI
D. The DSB will investigate and document any diving related incident
    I- The DSB will review and approve the release of the report before it may be submitted to other entities
        i. Reports submitted to other entities will be anonymized
    II- Written reports must include:
        i. Name, address, phone numbers of the principal parties involved
        ii. Summary of experience of divers involved
        iii. Location, description of dive site, and description of conditions that led up to the incident
        iv. The circumstances of the incident and the extent of any injuries or illnesses
        v. Description of symptoms, including depth and time of onset
        vi. Description and results of treatment
        vii. Disposition of case
        viii. Recommendations to avoid repetition of incident
E. Accident report and all pertaining information after an accident will be retained for at least 5 years

2.14 Voluntary Incident Reporting

The A&M-SA Dive Program has the mission to advance and facilitate safe and productive diving activities. As such, the A&M-SA Dive Program must create a safe environment allowing divers to report without fear of penalty situations that do not lead to accidents requiring recompression treatment, moderate or serious injury, or death. These reports are, and should be treated as, an invaluable opportunity to prevent serious accident, and will only be possible if they are encouraged and not punished

Diving incidents, near misses, and other situations NOT requiring recompression treatment, or resulting in moderate or serious injury, or death can, and are encouraged to be reported to the DSO

A. Diving incidents, near misses, and other situations NOT requiring recompression treatment, or resulting in moderate or serious injury, or death can, and are encouraged to be reported to the DSO
B. Voluntary incident reporting cannot be used to avoid penalties due to recurrent violations of the A&M-SA Diving Standards for Underwater Operations
C. Voluntary incident reporting has the only purpose to increase the safety standards of diving operations
    I- Voluntary incident reporting can be submitted anonymously; however, it is encouraged not to in order to receive feedback, including recommendations to avoid repetition/escalation of similar incident
    II- Voluntary incident reporting can be in a non-written form (e.g., conversation with the DSO, member of the DSB, or Instructional Personnel (see 1.6-1.7)
    III- Voluntary incident reporting cannot lead to a penalty to the divers involved
    IV- The DSO may recommend and offer opportunities for further practice, training, etc.
D. The DSO will inform the DSB during the following regular meeting about any voluntary incident reporting
    I- The DSO will immediately inform the DSB if deemed necessary (e.g., equipment failure that should be notified to the manufacturer for further investigation)
    II- If requested by the person making the report, the DSO will not disclose the name to the DSB
E. If deemed necessary, the DSB will review and approve the release of the report before it may be submitted to other entities
    I- Reports submitted to other entities will be anonymized

2.15 Categories of Diving at A&M-SA

Scientific diving

Activities that classified as scientific diving include:

A. Underwater research activities conducted by A&M-SA faculty, staff, and students following OSHA exemptions for scientific diving
B. University courses that lead to certification as a Scientific Diver
C. University courses that are teaching advanced tools or diving techniques for the ultimate purpose of scientific diving
D. Underwater activities to maintain proficiency in underwater research techniques
E. Underwater evaluations to obtain active status as scientific diver

Recreational and technical diving

Activities that classified as recreational and technical diving include:

A. All diving activities under the University auspices or sponsorship (e.g., organized by A&M-SA student´s Clubs) only requiring recreational or technical diving certifications
B. University courses that lead to recreational or technical diving certifications
C. Discover SCUBA activities under the University auspices or sponsorship

Pre-requisites, procedures, and standards are described in Sections 1-3Working diving

Activities classified as working diving as outlined in 29 CFR 1910, Subpart T

2.16 Certification requirements

All diving courses offered as part of a curriculum course may have a different threshold as a passing grade for the course, and a grade to receive diving certifications

A. Instructors may only certify students fulfilling the certification requirements by the internationally recognized training agency issuing the certification
B. Instructors must inform the students on grading standards for the course, diving certifications that may be obtained in a course, and requisites to obtain each certification offered
    I- Failure to cover the cost of a diving certification cannot affect the course grade, but will prevent the student from obtaining a certification from an internationally recognized training agency

Section 3. DIVING EQUIPMENT

3.1 General Policy

It is recommended that **PI and Instructors requiring equipment not included** in this manual to discuss at the proposal stage with the DSO and DSB such requirements for any course or research project. This will allow the DSO to help the PI/Instructor to select the most appropriate equipment, and to the DSB to update this dive manual as needed

A. All diving equipment must meet standards as determined by the DSO or DSB before it may be used for any diving activity under the auspices of A&M-SA
B. All equipment must be regularly examined by its user and serviced according to manufacturer recommendations
    I- Equipment that is subject to extreme usage under adverse conditions should require more frequent testing and maintenance
    II- Equipment service must be performed by a qualified technician
C. Records of all maintenance and tests for university-owned equipment must be kept by the A&M-SA Dive Program
D. Authorized use of university owned equipment includes
    I- During diving activities under the auspice of the A&M-SA dive program
        i. A&M-SA and external divers approved in the dive plan may use university own equipment
    II- A&M-SA divers under the auspice of another organization, via reciprocity or temporary diving permit
    III- A&M-SA scientific divers getting training with an external instructor
E. Authorized use of university owned equipment must be approved by the DSO
F. Unauthorized use of university-owned equipment is prohibited
    I- Texas A&M University - San Antonio should not be held liable for the safety of persons involved in the unauthorized use of university-owned diving equipment
G. Divers are responsible to check if the equipment is affected by a recall
    I- Equipment affected by a recall may not be used unless the manufacturer approves the repair or use under the type of dive to be performed (e.g., recall on a dive computer affects altitude dives, planned dives are at sea level)

Personally owned and rental diving equipment

Personal and rental diving equipment may be used for both scientific and recreational diving activities providing that the equipment is designed for the environment where it will be deployed and that the equipment is inspected, serviced, and maintained in accordance with the manufacturer's specifications

A. Mask, snorkel, fins, wetsuit, weights, and weight belts are not required to be registered
B. Personal diving equipment of A&M-SA divers
    I- Must be registered and approved by the DSO
        i. Registration and equipment maintenance records may be done by filling the Appendix 1b or an electronic file (e.g., excel worksheet) to the DSO
        ii. Registration of personal equipment must be renewed in accordance with the maintenance cycle required by the manufacturer
        iii. Equipment that is subjected to extreme usage under adverse conditions should require more frequent testing and maintenance
        iv. Service and significant repairs must be performed by trained and certified technicians
        v. Use of equipment that is not within the manufacturer's specifications for routine service, maintenance or testing will not be approved
    II- Divers using personal equipment are expected to maintain equipment maintenance records
    III- Texas A&M University - San Antonio shall not be held liable for personal equipment
C. Personal equipment of external divers
    I- External divers are fully responsible for their equipment
    II- Texas A&M University - San Antonio shall not be held liable for personal equipment of external divers
D. Rental equipment
    I- Rental equipment is expected to be serviced and repaired following all manufacturer's instructions
    II- Texas A&M University - San Antonio shall not be held liable for rental equipment

III- The DSO / DSB may restrict or refuse the use of rental equipment from Dive Shops if there is evidence that the equipment is not maintained per the manufacturer

Minimum equipment

A. Minimum equipment configuration for scientific and recreational diving modes
   I- Confined water, open circuit
      i. Regulator with first stage, primary second stage & alternate air source, and submersible pressure gauge
      ii. Buoyancy compensator
      iii. SCUBA mask
      iv. Snorkel
      v. SCUBA Fins
      vi. Thermal protection in accordance with the water temperature
   II- Open Water, open circuit
      i. Equipment on mentioned above (A.I)
      ii. Equipment for determination of decompression status
      iii. Cutting device (except during open water diver scuba certification dives)
      iv. Surface marker buoy (SMB) with at least 20 ft of line, or a spool with at least 100 ft of line
      v. Surface signaling device (e.g., safety whistle)
   III- Minimum equipment configuration for specialized equipment and technical diving are listed in their corresponding sections
   IV- A&M-SA and external divers must utilize at least the minimum equipment required by the University Dive Program
B. Minimum emergency equipment on site
   I- First Aid kit
   II- Emergency Oxygen Kit
   III- Satellite communicator
      i. Required on sites further than 30 minutes from cellphone or VHF reception
      ii. Recommended in all sites with no cellphone or VHF reception

iii. Recommended that one diver per buddy team has marine rescue radio GPS, or satellite communicator in a water-resistant case during diving operations offshore, especially in remote areas with low small-boat traffic

3.2 Equipment

Buoyancy Compensation Devices (BCD) and dry suits

A. Each diver 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 be equipped with an exhaust valve
C. BCD may not be substituted by a drysuit
D. These devices must be functionally inspected and tested at intervals not to exceed 12 months
E. Must be maintained in accordance with the manufacturer's recommendations
F. BCDs, dry suits, or other variable volume buoyancy compensation devices must NOT be used as a lifting device in lieu of lift bags

Equipment for determination of decompression status

A. Each member of the buddy team must have either
   I- An underwater timing device, depth indicator; and access to a dive table
      i. Dive tables must be available at the dive location
      ii. Must be rated for diving activities, or a minimum of 20 atm of pressure
      iii. Preferably, each diver will have redundancy in their equipment for determination of decompression status
   II- Dive tables
      i. During Scientific dives planned with dive tables within no decompression limits (NDL), dives will be planned without reaching the maximum time (i.e., if the maximum NDL in the dive table used is 63 min at 50 feet, and the previous time is 60 min, dives will be planned for no more than 60 min) as a conservative factor
   III-Dive computer

i. If a dive computer is used the diver must use the same computer used on repetitive dives
ii. The dive computer may not be used by another diver on that day
iii. Must be compatible with the diving mode (e.g., open circuit, rebreather), environment (e.g., altitude), and breathing gases used
iv. Must always be used with a safety or conservative factor for calculating the decompression status. A conservative gradient factor reduces the risk of DCS by reducing the non-decompression limits, or increasing the decompression stops requirements, depending on the type of dive. For example, dive computers with conservative factors '0', '1', or '2', will not be used with '0'; dive computers with the Bühlmann algorithm and user-adjustment capabilities, will use gradient factors 40/85 or more conservative
    1. Divers must be familiar with the manufacturer instructions regarding the decompression model and conservative factor prior to make any change
    2. Divers are encouraged not to make changes in the conservative settings without fully understanding the implications
    3. Divers are encouraged to discuss with the DSO changes in the conservative settings
    4. Less conservative settings in the main computer of a diver must be pre-approved by the DSB
v. Preferably, will be capable of firmware updates by the user
    1. Divers are recommended to check, and update, for firmware updates before each diving trip

B. Each diver is responsible for their own dive profile and should rely on their own equipment for determination of decompression status, unless of equipment failure
C. A diver can switch operations from a dive computer to the use of dive tables if the first fail. The following applies
    I- The Lead Diver must authorize the switch
    II- The diver will need to plan previous dives within the last 24 hours utilizing dive tables to accurately plan the following dives

III- If the dives are planned within NDL, and any of the previous dives within the last 24 hours exceeds NDL when planned with dive tables, the diver will need to wait at least 24 hours before resuming diving operations

D. In an aquarium or other manmade structures no deeper than 30ft (9m) of a known maximum obtainable depth
   I- A depth indicator is not required, except when a diver's decompression status must be taken into consideration on repetitive dives
   II- Only one buddy must be equipped with a timing device
   III- The maximum obtainable depth of the aquarium must be used as the diving depth

Regulators and gauges

A. SCUBA regulators and gauges must be inspected and tested prior to each use and serviced, at a minimum, according to manufacturer's recommendations
   I- Standard open circuit (OC) regulator configuration is
      i. A first stage
      ii. Primary 2nd stage
      iii. Back up 2nd stage
      iv. Submersible Pressure Gauge (SPG)
      v. Inflator hose for a BCD
   II- Must be suitable for the fO_2 to be used
      i. Regulators used with $fO_2 > 0.4$ must be oxygen serviced and always be used with SCUBA cylinders that are oxygen serviced and must be filled with oxygen compatible gases. If the regulator is used with a non-oxygen compatible gas, it will need to be oxygen cleaned by a qualified technician before it is used again with $fO_2 > 0.4$
   III- A Full-Face Mask may be used in place of the primary 2nd stage according to manufacturer's recommendations
   IV- An Air Integration (AI) transmitter and compatible dive computer may be used in place of the SPG with approval by the DSO
      i. The diver must verify the state of the battery and function prior to each use

ii. Use of AI transmitters do not require approval by the DSO if the regulator also has an analog SPG that can be read by the diver during diving operations

Full-Face (breathing) masks and helmets

A. Breathing masks and helmets will have
   I- A non-return valve at the attachment points between the helmet or mask and main gas supply hose, which will close readily and positively when the equipment is used in surface supply mode
   II- An exhaust valve
   III- A minimum ventilation rate capable of maintaining the diver at the planned depth
B. Must be inspected and serviced following the manufacturer recommendations
C. The non-return valve at the attachment points between helmet or mask hose, and the exhaust valve, must be tested regularly and during pre- and post- dives to ascertain that it operates in accordance with manufacturer's specifications

SCUBA Cylinders

A. SCUBA cylinders must
   I- Be designed, constructed, and maintained in accordance with the applicable provisions of the Unfired Pressure Vessel Safety Orders (29CFR 1910.101 and 1910.171)
   II- Be hydrostatically tested in accordance with DOT standards
   III- Have an internal and external visual inspection at intervals not to exceed 12 months
   IV- Be functionally tested at intervals not to exceed 12 months
   V- Be serviced in accordance with the fO_2 to be used
      i. Cylinders filled with a gas with $fO_2 > 0.4$ must be oxygen serviced and always be used with oxygen compatible gases. If the cylinder is used with a non-oxygen compatible gas, it will need to be oxygen cleaned by a qualified technician before it is used again with $fO_2 > 0.4$
      ii. Cylinders filled with mixtures with $fO_2 \leq 0.4$ by partial pressure blending must be oxygen serviced
B. SCUBA cylinders during operations abroad must

I- Comply with local safety regulations regarding cylinder maintenance, transportation, and inspection
II- Be designed, constructed, and maintained in accordance with DOT or CE standards
III- Be hydrostatically tested in accordance with DOT or CE standards
i. Hydrostatic must be done at no longer than 5-year intervals
IV- Be serviced in accordance with the fO_2 to be used

C. SCUBA cylinders made of aluminum alloy 6351-T6 are not allowed regardless of the test performed (see DOT Notice No. 94-7)

Weights and weight systems

A. Divers must use sufficient weight to maintain the diver at working depth, and will not exceed the capabilities by of the BCD used
I- Divers are encouraged to only use enough weights to achieve neutral buoyancy
B. In dives conducted in open water environments within no decompression limits
I- Must use a weight system with the following characteristics
i. Capable of quick release
ii. Attached in such a manner to avoid accidental disengagement
II- Use of trim weights are allowed
C. In dives conducted in overhead environments and with planned decompression stops
I- Weight systems can or not be capable of quick release
II- Weighs must be attached in such a manner to avoid accidental disengagement

Reserve Gas Supply (RGS)

A. Reserve breathing Gas Supply (RGS; also known as Reserve Air Supply System - RASS) will
I- Be independent of the primary gas supply
II- Have a cylinder meeting the requirements outlined before (3.2-SCUBA cylinders)
III- Have sufficient gas volume to allow the diver to safely return to the surface
IV- Have a regulator on the cylinder capable of delivering the proper pressure and flow to the divers second stage regulator, full-face mask, or helmet, in

accordance with the flow characteristics recommended by the manufacturer and additional requirements of over-bottom pressure

V- Have a means of attachment to a diver that prevents accidental disengagement

VI- Will provide indication to the diver their reserve has been activated

i. Such indication can be the requirement of the diver to open a valve, a visual signal, or other appropriate method

VII- Meet all the characteristics outlined on 2.4-Reserve Gas Supply System

B. RGS cannot be used to deploy lift bags or surface marker buoys under any circumstance

3.3 Support Equipment

First Aid and Emergency equipment

A. First Aid Kit, which must

I- Be adequate for the dive operation, and will be on site and readily available during all dive operations

i. Must include personal protective equipment, nitrile gloves and a CPR barrier are required, at a minimum

ii. A CPR pocket mask with Oxygen inlet is preferred over a CPR barrier

II- Contain a list with available items

i. This list, and expirations dates, must be periodically reviewed

III- Preferably, stored in a waterproof case

B. Emergency Oxygen Kit, which must

I- Be available at the dive site during all dive operations

i. Prior to each dive trip the Lead Diver will check the following

1. All the contents are present, clean, and ready for assembly
2. The cylinder contains sufficient Oxygen
3. First and second regulator stages are functioning

II- Have regulators capable of supplying oxygen to two individuals simultaneously. It is acceptable supplying oxygen to both individuals with a different type of regulator (i.e., demand valve) / mask (i.e., non-rebreather masks)

III- Hold a sufficient 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

IV- Include all the hardware required to supply two unconscious victims at the dive location
i. All the hardware must be Oxygen compatible

V- Be serviced in accordance with the manufacturer, including
i. Oxygen cylinders must be visually inspected annually and hydrostatically tested every five years by an authorized technician
ii. Cylinder valves must be inspected and serviced at the same time than the oxygen cylinder
iii. First and second stage regulators must be serviced at least every two years, or following the manufacturer's recommendations, whichever is less

VI- Preferably,
i. Be stored in a waterproof case
ii. Include extra metal/rubber washers
iii. Include nitrile gloves and a CPR barrier

C. Automated External defibrillator (AED)

I- AED are recommended but not mandatory to be available during diving operations

II- If available, the Lead Diver will check the following prior to the dive trip
i. It has all the necessary hardware
ii. Expiration date of the pads
iii. State and expiration date of the batteries

III- AED used for diving operations must
i. Be appropriate for use with adults
ii. Contain all the hardware appropriate for its use
iii. Be maintained in accordance with the manufacturer's recommendations

IV- Preferably,
i. Will be stored in a waterproof case
ii. Include extra batteries and pads
iii. Include nitrile gloves and a CPR barrier

D. Satellite communicator
    I- Required on sites further than 30 minutes from cellphone or VHF reception
    II- The Lead Diver must check prior to any dive trip
        i. Its functioning
        ii. State of the battery
        iii. If required, state of subscription plan

Gas Analyzers

A. Gas analyzers are required when employing breathable gasses other than air
    I- Dive operations utilizing Nitrox require Oxygen Analyzers
    II- Dive operations utilizing any form of Trimix (e.g., Trimix, HeliAir) require Oxygen and Helium Analyzers
    III- Must be available for all dive team members to analyze and mark their tanks
        i. This can be done prior to travel to the dive site, but each diver must analyze the cylinders that they will use
B. Analyzers must
    I- Be capable to read the gas content in the cylinder
    II- Will be capable to read a scale of 0 to 100%
    III- Accuracy of Oxygen and Helium analyzers must be ≤2%
C. Preferably,
    I- Two or more analyzers are going to be available, and used in pairs to reduce likelihood of errors due to a faulty analyzer
    II- Be available at the dive site
D. Must be maintained in accordance with the manufacturer's recommendations

Dive Flag

A. A diver's flag must be displayed prominently whenever diving is conducted under circumstances where required or where water traffic is probable
B. The flag will be appropriate in size and flown in a manner allowing all-around visibility and with illumination during night diving operations
C. Acceptable dive flags are
    I- International code Alpha Flag; white and blue with cut-out notch
        i. This must be used on federal water or in areas where international shipping traffic is expected

II- Diver's flag; red with a white stripe from the upper left corner to the lower right corner

D. Use of Dive Flags must follow local regulations (e.g., a rigid alpha flag may be required)

Dive lights

A. Dive lights must be rated at least for the maximum depth planned
B. Primary dive lights must have the following characteristics
   I- Burn time must be at least the planned total dive time
   II- Output of at least 300 lumens,
      i. For cave diving, the minimum output is 1,000
C. Secondary dive lights must have the following characteristics
   I- Burn time must be of at least 60 minutes
      i. For cave diving, must be at least double the time required to return to the exit from the farthest point of the dive
   II- For cave diving, have an output of at least 300 lumens
   III- Be easy to deploy and operate
      i. Must be attached to the diver in a secure way that allows its easy deployment
D. Underwater video lights are not allowed as primary or secondary light. Video lights have a wide and plain beam that affects their performance to make light signals
   I- Dual-Beam lights with wide and narrow beams can be used as primary or secondary lights

Surface Marker Buoys (SMB) and Lift Bags

A. Surface Marker Buoys (SMB) and lift bags of less than 25 lbs. positive buoyancy may be deployed from a diver's gas supply used for life support
B. SMB and lift-bags of more than 25 lbs. positive buoyancy may only be inflated from a separate diver-carried or surface supplied gas source
   I- RGS cannot be used to deploy SMB or lift bags under any circumstance

3.4 Auxiliary Equipment

Handheld Underwater Power Tools

A. It is recommended that PI requiring the use of specific underwater power tools discuss with the DSO and DSB at the proposal stage of the project
B. Underwater Power Tools, energized, hydraulic, and pneumatic, must be specifically approved by the DSB
C. Tools and equipment supplied with power from the surface must be de-energized before being placed into or retrieved from the water
D. Handheld power tools must not be supplied with power from the dive location until requested by the diver

3.5 Equipment Maintenance

All equipment maintenance must, at the minimum, follow the manufacturer's recommendations. Equipment under intensive and/or demanding use, should have shorter maintenance periods

Record Keeping

A. University owned equipment
    I- Each equipment modification, repair, test, calibration, or maintenance service must be logged for the following equipment
        i. Regulators
        ii. Gauges (SPG, Depth Gauges, Timers, and Dive Computers)
        iii. BCDs
        iv. Dry suits
        v. SCUBA cylinders and valves
        vi. Full Face Masks
        vii. Compressors, air filtration systems, gas control panels, and storage banks
        viii. Surface supplied equipment
        ix. Rebreather systems
        x. Additional equipment categories as determined by the DSB

II- Service logs can be physical or electronic, and must include at least the following information
   i. Date
   ii. Nature of work performed
   iii. Serial number of the item (if applicable)
   iv. Name of the person performing the work
   v. Company where the work was performed (if applicable)
   vi. Results of any test (if applicable)

B. Personal equipment
   I- Each diver is responsible for keeping maintenance records of their equipment

3.6 Air Quality Standards

Breathing Gas Standards

A. Breathing air to be directly used by a diver, or to be used to mix other breathing gas, must meet the following specifications as set forth by the Compressed Gas Association (CGA Pamphlet G-7.1; see table below)

CGA Grade E	
Component	**Maximum**
Oxygen	20 - 22%/v
Carbon Monoxide	10 PPM/v
Carbon Dioxide	1000 PPM/v
Condensed Hydrocarbons	5 mg/m3
Total Hydrocarbons as Methane	25 PPM/v
Water Vapor ppm	(*)
Objectionable Odors	None

(*) 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

B. Any air that may come in contact with oxygen concentrations >40% must also have a hydrocarbon contaminant ≤ 0.1mg/m^3
C. Oxygen used for mixing breathing gases should meet purity levels for "Medical grade" (U.S.P.) or "Aviator Grade" standards
D. The quality of inert gases used to produce breathing mixtures must be of an acceptable grade for human consumption

3.7 Operations with commercially operated compressors

It is the diver's responsibility and duty to refuse to dive, without fear of penalty, if in the diver judgment, conditions are unsafe or unfavorable, including the quality of breathable gas

Within the United States

A. Fill stations used to rent and fill SCUBA must
   I- Comply with the Air Quality Standards (3.6)
   II- Be able to provide a copy of the latest air test
      i. Air tests are valid for up to 6 months from the date of the test
      ii. Must be valid at the rental / fill date
B. The Lead Diver must provide with the current air test to the DSO
C. The DSO and DSB has the authority to deny the procurement of breathing gases from commercial operations that fail to provide current air test, with questionable gas quality, or with questionable maintenance of cylinders and valves

Operations Abroad

A. At the planning stage of the trip, the Lead Diver, PI, or Instructor will inform the participants about the expectations on breathable gas quality at the location
   I- This has the intention to allow the prospective participants to decide if they are comfortable with what is expected in the field
   II- It is recommended that the Lead Diver, PI, or instructor also inform the DSO prior to the submission of the dive plan
B. Breathable gas must comply with local regulations

I- The Lead Diver will compare Air Quality Standards with those in 3.6

C. If local regulations are not available
   I- Divers should prioritize fill stations that can provide an air test
      i. Results from the air test must comply with the Air Quality Standards (3.6)
      ii. Air tests are valid for up to 12 months
   II- If fill stations in the region cannot provide with an air test
      i. Preferred fill stations
         1. Use an electric compressor
         2. Have inline CO monitors
   III- It is recommended that the Lead Diver seek advice from local dive professionals about commercial operators providing with good quality breathable gas

D. If air test does not comply with the minimum Air Quality Standards in 3.6, or are not available
   I- Prior to the start of diving activities, the Lead Diver will
      i. Notify all divers about the lack of air test in the region prior to the start
      ii. Discuss with all divers, in relation to CO and CO_2 intoxication
         1. Signs and symptoms
         2. Underwater emergency procedures
         3. First aid procedures
   II- Divers will smell the gas of each cylinder prior to use – No odor should be detected
   III- Divers will test the gas of each cylinder prior to use underwater – No taste should be detected

E. It is recommended to have an Oxygen and Carbon Monoxide (CO) analyzers
   I- If available, at least one cylinder per gas-fill batch/day should be analyzed
   II- Should be accessible to all divers

F. The DSO and DSB has the authority to deny the procurement of breathing gases from commercial operations with questionable gas quality, or with questionable maintenance of cylinders and valves

Section 4. SCIENTIFIC DIVER CERTIFICATION AND AUTHORIZATIONS

This section describes the training and performance standards for Scientific Divers and represents the minimum required level of knowledge and skills presented in a generalized format

4.1 Research Proposals Submitted that include Scientific Diving Methods

The Dive Safety Board and the Dive Safety Officer are responsible to promote safe and high-quality underwater research utilizing Scientific Diving methods. A&M-SA faculty and personnel are encouraged to discuss with the DSO research proposals requiring Scientific Diving from the early stages of the proposal.

A. Proposals that are submitted by faculty for extramural funding that require Scientific Diving must be approved by the DSO
   I- Approval or proposals by the DSO must occur in a timely manner to avoid delaying the proposal submission process
   II- PI are recommended to notify the DSO of an upcoming proposal submission requiring approval
B. Primary Investigators are encouraged to include in the "Methods" section a statement in relation with Scientific Diving to ensure success at the compliance state. The following is a suggested statement
   I- "Scientific Diving activities will be conducted under safety standards that meet or exceed those established by Texas A&M University - San Antonio, and the American Academy of Underwater Sciences"
C. Approval of dive plans are still required prior to the start of any diving activity
D. Recommendations to avoid delays in approval of research proposals and dive plans for research requiring techniques or equipment not included in this manual
   I- The PI should discuss early at the proposal stage with the DSO and DSB such requirements for any research project
   II- The DSO and DSB should evaluate if updates to this dive manual are needed
   III- The PI may seek advice from the DSO in the selection of the equipment and training required

4.2 Prerequisites

Administrative

The candidate must complete all administrative and legal documentation required by the dive program at A&M-SA, including:

A. Complete the *Diving Program Application* (Appendix 1)
B. Complete the Release of Liability, Waiver of Rights, and Indemnification Agreement (Appendix 2)
C. Valid diving insurance (e.g., DAN's Master level or above insurance; or equivalent)
D. Diver certification cards accordingly to the level seek
    I- Training as Scientific Diver requires an entry level diver certification (see below)
E. Current medical first responder certifications from recognized agencies. These certifications are valid for two years, or printed expiration date in the certification, whichever is shorter. Courses without in-person practice are not valid
    I- First Aid
    II- Cardiopulmonary resuscitation (CPR) for adults
    III-Automated external defibrillator (AED) for adults
    IV-O_2 administration for diving accidents
F. Instructors of medical first responder courses from a recognized agency fulfill requirements on E by:
    I- Maintaining active instructor status; and
    II- Teaching the courses at least once every 2 years
G. Any other document required by the diving agency certifying the instructor status of the DSO or approved A&M-SA Diving Instructor
H. Optional, recommendation letter from a faculty member or researcher stating the need for scientific diving training and information on the project in which the student will be involved

Scientific divers transferring into A&M-SA

A. Divers transferring into the A&M-SA Diving Program from another AAUS organization member, from a US Federal or State Agency with a scientific program (e.g., USGS), or international institution with a) Dive Safety Board **AND** b) Dive

manual (if not, see point B), also require a signed and valid *Verification of Training* form, and:

I- For Scientific divers fulfilling the requirements to maintain active status (see 4.6), and at least 100 task loaded dives (i.e., scientific dives, working dives, instructing or assisting an instructor on dive courses)
   i. Can be directly approved for active status
   ii. The applicant cannot serve as Lead Diver on the first dive plan in which the applicant participates. This restriction can be fulfilled with a SCUBA skill checkout with the DSO, and DSO approval

II- For Scientific divers fulfilling the requirements to maintain active status, but with less than 100 task loaded dives (i.e., scientific dives, working dives, instructing dive courses):
   i. SCUBA skill checkout by DSO, or approved A&M-SA Diving Instructor, which can be performed on confined or open water

III- For Scientific divers not fulfilling the requirements to maintain active status, but with at least 100 task loaded dives, with at least one dive in the previous six months:
   i. SCUBA skill checkout by DSO, or approved A&M-SA Diving Instructor, which can be performed on confined or open water

IV- For Scientific divers not fulfilling the requirements to maintain active status, with less than 100 task loaded dives (i.e., scientific dives, working dives, instructing dive courses), or no logged dives in the previous six months:
   i. Demonstrate swimming skills by completing one on the exercises as described on 4.2 *Swimming evaluation* A-C
      1. Divers arriving from a non-AAUS OM, if the institution Dive Manual does not include an equivalent swimming evaluation as described below, will need to complete all the exercises
   ii. Written exam covering topics related to diving theory appropriate to the depth rating authorization and type of diving seek by the applicant
   iii. SCUBA skill checkout by DSO, or approved A&M-SA Diving Instructor, which can be performed on confined or open water

V- The DSO can require further examination for approval. The DSO is required to inform the DSB the reasons to require further examination

B. Divers transferring into the A&M-SA Diving Program from an international institution that is not an AAUS organization member and without a) Dive Safety Board **OR** b) Dive manual, will require
   I- A letter by the applicant stating the experience on Scientific Diving activities and providing the name and contact information of a professional reference familiar with Scientific Diving
   II- Demonstrate swimming skills by completing all the exercises as described on 4.2 *Swimming evaluation*
   III- Written exam covering topics related to diving theory appropriate to the depth rating authorization and type of diving seek by the applicant.
   IV- SCUBA skill checkout by DSO, or approved A&M-SA Diving Instructor, which can be performed on confined or open water
   V- A letter of recommendation by the DSO based on the certifications, qualifications, experience of the candidate, and results from the points II-IV
   VI- Approval by the DSB

Entry level diver certification

Entry level diver certification is a prerequisite to *Scientific Diver Training*. The candidate must, at minimum, show documented proof of Diver Certification or equivalent from an internationally recognized training agency under the standards of the most current version of the RSTC/WRSTC, ISO, and/or CMAS entry-level diver standards

- "Minimum Course Content for Open Water Diver Certification"- World Recreational SCUBA Training Council (WRSTC), www.wrstc.com
- "Safety related minimum requirements for the training of recreational SCUBA divers – Part 2: Level 2 – Autonomous diver". ISO 24801-2:2014 - International Organization for Standardization (ISO) - www.iso.org
- "One Star Diver" from the Confédération Mondiale des Activités Subaquatiques (CMAS) or an affiliated Federation - www.cmas.org

Medical examination

The candidate must be medically qualified for diving as described in Section 5 and Appendices 3-5 of this Manual. The A&M-SA dive program follows the AAUS medical standards, and these shall not be waived.

Swimming evaluation

Applicants will successfully demonstrate they possess reasonable aquatic ability by performing the following skills, in the presence of the DSO, or an examiner approved by the DSO. All tests are to be performed without swim aids (except for E), goggles or SCUBA mask are allowed. However, where exposure protection is needed, the candidate must be appropriately weighted to provide for neutral buoyancy

A. Swim underwater for a distance of 25 yards (23 m) without surfacing
B. Swim 400 yards (366 m) in less than 12 minutes
C. Transport a passive person of equal size a distance of 25 yards (23 m) in the water
D. Tread water for 10 minutes, or two minutes without the use of hands
E. Activities under the swimming evaluation must be completed in a single session. A break of up to 10 minutes between activities is allowed

4.3 Scientific Diving Training

General information

A. The candidate must successfully complete all prerequisites prior to starting Scientific Diving Training
B. Scientific Diving Training must include theoretical aspects, practical training, and examinations for a minimum cumulative time of 100 hours and a minimum of 12 open water dives
    I. When a diver's resume provides clear evidence of significant scientific diving experience, the diver can be given credit for meeting portions of the 100-hour course requirements
C. Theoretical aspects must include principles and activities appropriate to the intended area of scientific study
D. The DSB or DSO will identify specific overlap between on-the-job training, previous scientific diving training/experience and course requirements, and then determine how potential deficiencies will be resolved
    I. A&M-SA cannot "test-out" divers, regardless of experience, when they have no previous experience in scientific diving

E. Any candidate who does not convince the DSB, through the DSO, that they possess the necessary judgment, under diving conditions, for the safety of the diver and his/her buddy, may be denied A&M-SA Scientific Diving privileges
F. Scientific diving courses offered as part of a curriculum course may have a different threshold as a passing grade, and a grade to receive Scientific Diving Status
    I. The DSO may offer extra-curricular training and evaluation in such cases

Theoretical requirements

A. Theoretical training may include in-person and online components
B. Required topics
    I. AAUS Scientific Diving Regulations and History
        i. Classification of diving activities: recreational, scientific, and commercial diving
        ii. Scientific dive planning
        iii. Coordination with other agencies
        iv. Appropriate governmental regulations
    II. Hazardous materials training
        i. Handling of high-pressure cylinders
        ii. Chemical hygiene
        iii. Laboratory safety
    III. Dive physics (Beyond entry level SCUBA)
    IV. Dive physiology (Beyond entry level SCUBA)
    V. Hazards of breath-hold diving and ascents
    VI. Decompression theory and its application
    VII. Diving emergency care training
        i. Cardiopulmonary Resuscitation (CPR)
        ii. Automated external defibrillator (AED)
        iii. Standard or Basic First Aid
        iv. Recognition of DCS and AGE
        v. Accident management
        vi. Field neurological exam
    VIII. Dive rescue
    IX. Dive environments

X. Scientific method
XI. Data gathering techniques specific to area of study required, may include
    i. Transects and quadrats
    ii. Mapping
    iii. Coring
    iv. Photography
    v. Tagging
    vi. Collecting
    vii. Animal handling
    viii. Archaeology
    ix. Common biota
    x. Organism identification
    xi. Behavior
    xii. Ecology
    xiii. Site selection, location, and re-location
    xiv. Specialized data gathering equipment

C. Suggested topics
    I. Specific Dive Modes (methods of gas delivery)
        i. Open Circuit
        ii. Hookah
        iii. Surface Supplied diving
        iv. Rebreathers (closed and/or semi-closed)
    II. Specialized breathing gas
        i. Nitrox
        ii. Trimix
    III. Small Boat Operations
    IV. Specialized environments and conditions, that may include
        i. Blue water diving
        ii. Altitude
        iii. Ice and polar diving (cold water diving)
        iv. Low and zero visibility diving
        v. Polluted water diving
        vi. Saturation diving

vii. Decompression diving
viii. Overhead environments
ix. Aquarium diving
x. Night diving
xi. Kelp diving
xii. Strong current diving
xiii. Potential entanglement/entrapment
xiv. Live boating

V. Specialized Diving Equipment
i. Full face mask
ii. Dry Suit
iii. Communications
iv. Dive Propulsion Vehicle (DPV)
v. SMBs/Lift Bags
vi. Line Reels

D. Other topics and techniques as determined by the DSB

Practical requirements

A. Use of personal diving equipment during training and dive checkouts must follow the A&M-SA Diving Standards for Underwater Operations (Section 3)
B. Confined water evaluation
I. Enter water fully equipped for diving
II. Demonstrate the ability to alternate snorkel and SCUBA while swimming
III. Clear fully flooded face mask underwater while maintaining neutral buoyancy
IV. Demonstrate air sharing and ascent as both donor and recipient
i. Ascent must be demonstrated in at least one of the exercises
ii. Using an alternate air source
iii. Using an alternate air source as recipient, without a mask
iv. Buddy breathing
v. Buddy breathing as donor, without a mask
V. Demonstrate understanding of underwater signs and signals
VI. Demonstrate ability to remove and replace equipment

i. On the surface
ii. While submerged, maintaining neutral buoyancy

VII. Demonstrate acceptable watermanship skills for anticipated scientific diving conditions

VIII. Demonstrate acceptable buoyancy control

C. Confined water evaluation must be approved by the DSO prior to any open water dive

D. Practical training must include at least

I. 12 dives open water dives in a variety of dive sites, including 1 checkout dive

i. The first open water dive must be a checkout dive with the DSO or Scientific Diving Instructor
ii. Except for checkout dives, all dives must include at least one underwater scientific diving tasks in order to count towards the scientific diving training
iii. May be conducted over a variety of depth ranges, not to exceed 100 feet (30 m) during the initial 12 dive cycle
iv. Depth may not exceed the certification level of any diver, unless it is an approved dive supervised by a qualified Dive Instructor from a course seeking in a deeper certification
v. Depth progression must proceed shallower to deeper after acceptable skills and judgment have been demonstrated

II. Cumulative total dive time (i.e., surface to surface) on open water environments of 6 hours

E. Dives following the checkout dive(s) may be supervised by an active Scientific Diver

i. The active Scientific diver must hold the necessary depth authorization and experienced in the type of diving planned
ii. The trainee must be registered as a A&M-SA Diver-In-Training
iii. Requires DSO approval

F. The trainee must satisfy to the DSO or Scientific Diving Instructor the ability to perform all the skills listed below (G-H)

G. Open water evaluation

I. Evaluated on all dives

i. Demonstrate judgment adequate for safe scientific diving, prior, during, and after diving activities
ii. Enter and exit water while wearing SCUBA gear
iii. Underwater communications
iv. Demonstrate the ability to maneuver efficiently in the environment, at and below the surface
v. Demonstrate ability to achieve and maintain neutral buoyancy while submerged

II. Checkout dive element
i. Previous skills (see G.I)
ii. Surface dive to a depth of 10 feet (3 meters) without SCUBA
iii. Kick on the surface 400 yards (366 meters) while wearing SCUBA gear, but not breathing from the SCUBA unit
iv. Demonstrate proficiency in air sharing ascent as both donor and receiver
v. Complete a simulated emergency swimming ascent
vi. Demonstrate clearing of mask and regulator while submerged and maintaining neutral buoyancy
vii. Demonstrate techniques of self-rescue and buddy rescue
viii. Demonstrate ability to achieve and maintain neutral buoyancy while completing a task (e.g., tool transfer, writing on a slate)
ix. Rescue skills
1. 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 (Recommendations for rescue of a submerged unresponsive compressed-gas diver are available on Appendix 6c)
2. Demonstrate simulated in-water mouth-to-mouth resuscitation
3. Removal of victim from water to shore or boat
4. Stressed and panicked diver scenarios

III. Evaluated at some point during the training cycle
i. Plan and execute a dive following the A&M-SA Diving Standards for Underwater Operations
ii. Navigate underwater

4.4 Scientific Diver Certification and Authorization

A. Only a person diving under the auspices of A&M-SA Dive Program is eligible for a Scientific Diver certification and/or authorization
B. A certified Scientific Diver must be authorized (see 4.5, and sections 6-13) and active (see 4.6) prior to any scientific dive

Scientific diver-in-training (SDIT) authorization

A. This is an authorization to dive, usable only while it is current and for the purpose intended
    I. Available for certified divers (see 4.2 "Entry level diver certification") with the knowledge skills and experience necessary to commence and continue training as a scientific diver under supervision, as approved by the DSB
B. SDIT 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
    I. Participation of a SDIT on any scientific dive outside of a course towards Scientific Diver certification requires DSB approval

Scientific diver certification (SD)

A. Scientific Diver certification means that a diver has completed all requirements in Section 4.2 & 4.3 and is certified by the University to engage in scientific diving without supervision, as approved by the DSB through the DSO
B. Submission of documents and participation in aptitude examinations does not automatically result in certification. To be certified, the applicant must
    I. Demonstrate to the DSB, through the DSO, that they are sufficiently skilled and proficient
    II. Demonstrate that possess the necessary judgment for their safety and that of the dive team
C. A Scientific Diver Certification is only active when required authorizations are in place and current following the A&M-SA Diving Standards for Underwater Operations
D. Certification as a Scientific Diver can be achieved by

I. Scientific Diving training at A&M-SA
II. Training by an Organizational Member and completion of all prerequisites (see 4.2)
III. Alternative training, for divers that meet or exceed the knowledge and skills expected by a Scientific diver who has completed at least 100 hours of theoretical and practical training (see 4.2)

Temporary scientific diver authorization (TSD)

A. Temporary Scientific Diver authorization is only available to divers with the knowledge and skills of a Scientific Diver who is not affiliate with an AAUS organizational member, US Federal or State Agency with a scientific diving program (e.g., USGS)
B. The individual in question must demonstrate proficiency in diving and can contribute measurably to a planned dive
C. A Temporary Diver Authorization constitutes a waiver of the requirements outlined in Section 4 and is valid only for a limited time, as approved by the DSB
    I. Application process and further details are described in section 1.9
D. A Temporary Diver Authorization is restricted to the planned diving operation and must comply with all other policies, regulations, and standards of this Manual, including medical requirements
E. This authorization is not to be utilized as a repeated mechanism to circumvent existing standards set forth in this Manual

External diver volunteer authorization

A. External diver volunteer authorization is only available to divers with the knowledge and skills of a Diver, but not of a Scientific Diver, who is not affiliate with an AAUS organizational member, US Federal or State Agency with a scientific diving program (e.g., USGS)
B. The individual in question must demonstrate proficiency in diving and can contribute measurably to the safety of a planned dive
C. External diver volunteers are not authorized to
    I. Collection of data, samples, or conducting any other activity that can be consider as part of a scientific dive
    II. Utilize university-own equipment

III. Receive compensation by the university

D. Examples of acceptable tasks by an external diver volunteer are serve as a dive buddy of a Scientific diver, take photos or video not to be used for scientific purposes (can be used for outreach), to fulfill local regulations requiring the presence of a local dive professional, serve as a safety diver (especially during complex or very technical operations)
E. Application process and further details are described in section 1.10
F. This authorization is not to be utilized as a mechanism to circumvent existing standards set forth in this Manual
G. External diver volunteers may only be approved when all requirements (A-F) are met, these requirements cannot be waived
H. As with any diver, external diver volunteers may call the dive at any time for any reason
I. It is the responsibility of the Lead Diver to fully brief external diver volunteers about their capacities, limitations, capability to call the dive at any time dive, and details of the diving operations prior to any dive

4.5 Depth and Special Techniques/Technologies Authorizations

General

A. Authorizations indicates approval to conduct science
    I. Depth authorization indicates the maximum depth in which a diver can conduct science
        i. With prior authorization by the DSO, may also supervise other divers holding a lesser depth authorization
    II. Special Techniques/Technologies authorizations indicate specialized techniques and equipment that a diver can use to conduct science
        i. Requirements are detailed in Sections 6-13
B. In the event a diver within the A&M-SA Dive Program does not hold an authorization at the desired depth next level or with the desired specialized techniques/technology the DSB may authorize a required progression or procedure for a diver to attain such authorization

i. In this event, it is recommended that the DSO also obtain such authorization, or gets certified for such depth, technique, or technology (see 1.5 – Qualifications)

C. A Scientific Diver requires with a valid depth authorization is to be considered an Active Scientific Diver
D. Divers must hold a certification from an internationally recognized training agency to the depth that the diver seeks authorization
   I. University approved courses may include training following an internationally recognized agency and seek depth authorization as part of the same course
   II. Divers may obtain a depth authorization intermediate (e.g., 50-feet) than the listed below in accordance with the diver certifications
E. A diver may be authorized to the next depth level after successfully completing the requirements for that level
   I. In some circumstances, the DSO may authorize depths based on a diver's past dive record prior to entering the A&M-SA Dive Program
F. A diver may exceed the depth authorization when accompanied and supervised by a dive buddy holding a depth authorization greater or equal to the intended depth
   I. Dives must be planned and executed with the permission of the DSB or DSO
   II. Dive plans must explicitly include details on supervised divers exceeding the depth authorization
   III. The dive buddy of the diver exceeding the depth authorization must be the Lead Diver, Instructional personnel, or Instructor Assistants / Divemaster (see 1.6-1.8)
   IV. The diver exceeding the depth authorization may not exceed the depth of the immediate superior level
G. If local conditions do not conform to depth progressions as outlined by AAUS, the DSB may devise a reasonable accommodation. However, the total number of dives to obtain a given depth authorization must follow the cumulative number of dives, and fulfill requisites from previous depth levels as listed under *Scientific Diving depth ratings and progression to next depth level*

Scientific Diving depth ratings and progressions to next depth level

A. 30-feet depth
    I. Initial Science Diver depth authorization, approved upon the successful completion of training listed in Section 4.2-4.3
    II. Cumulative minimum supervised dives: 12
B. 60-feet depth
    I. A diver holding a 30-feet authorization may be authorized to a depth of 60 feet after successfully completing and logging 12 supervised dives to depths between 31 and 60 feet under supervision of a diver authorized by the DSB
    II. Cumulative minimum supervised total dive time: 6 hours
    III. Cumulative minimum supervised dives: 24
C. 100-feet depth
    I. A diver holding a 60-feet authorization may be authorized to a depth of 100 feet after successfully completing and logging 6 supervised dives to depths between 61 and 100 feet under supervision of a dive buddy authorized by the DSB
    II. The diver must demonstrate proficiency in the use of the appropriate decompression profiling method
    III. Cumulative minimum supervised dives: 30
D. 130-feet depth
    I. A diver holding a 100-feett authorization may be authorized to a depth of 130 feet after successfully completing and logging 6 supervised dives to depths between 100 and 130 feet under supervision of a dive buddy authorized by the DSB
    II. Cumulative minimum supervised dives: 36
E. 150-feet depth
    I. A diver holding a 130-feet authorization may be authorized to a depth of 150 feet after successfully completing and logging 6 supervised dives to depths between 130 and 150 feet under supervision of a dive buddy authorized by the DSB
    II. The diver must also demonstrate mastery of the knowledge and considerations for the special problems of deep diving, and of the special safety requirements

III. Certification in the use of TRIMIX breathing gas is recommended
IV. Depending on the complexity of the tasks, the DSB or DSB may require the dive team to use TRIMIX breathing gas
V. Cumulative minimum supervised dives: 42

F. 190-feet depth
I. A diver holding a 150-feet authorization may be authorized to a depth of 190 feet after successfully completing and logging 6 dives to depths between 150 and 190 feet under supervision of a dive buddy authorized by the DSB
II. It is recommended a certification in the use of TRIMIX breathing gas
i. A diver not certified in the use of TRIMIX will receive a 180-feet authorization
III. In accordance with section 2.2 – Number of dives and oxygen exposure, **Diving on air is not permitted beyond a depth of 185 feet (56.6 m)**
IV. Depending on the complexity of the tasks, the DSB or DSO may require the dive team to use TRIMIX breathing gas to reduce the risk
V. Cumulative minimum supervised dives: 48

G. 250-feet depth
I. A diver holding a 190-feet authorization may be authorized to a depth of 250 feet after successfully completing and logging 6 supervised dives to depths between 190 and 250 feet under supervision of a dive buddy authorized by the DSB
II. It is required a certification in the use of TRIMIX breathing gas
i. The DSB or DSO may require a certification in the use of hypoxic TRIMIX breathing gas
III. Cumulative minimum supervised dives: 54

H. 300-feet depth
I. A diver holding a 250-feet authorization may be authorized to a depth of 300 feet after successfully completing and logging 6 supervised dives to depths between 200 and 250 feet under supervision of dive buddy authorized by the DSB
II. It is required a certification in the use of TRIMIX breathing gas
i. The DSB or DSO may require a certification in the use of hypoxic TRIMIX breathing gas

III. Cumulative minimum supervised dives: 60

I. Authorizations deeper than 300 feet
   I. Divers requiring >300 feet depth authorization must inform the DSB in a timely manner in order to develop safety standards for operations requiring depths exceeding 300 feet, and depth authorization requirements
   II. Internationally recognized training agencies do not offer certifications exceeding 330 feet / 100 meters

4.6 Maintaining Active Status and Depth Authorization

A. In order to maintain Active Scientific Diver status divers
   I. Fulfill the administrative and medical evaluation prerequisites (see 4.2)
   II. Log a minimum of 12 dives in the previous 12-month period
      i. At least 6 dives must be task loaded dives (e.g., scientific dives, working dives)
   III. Annually demonstrate techniques of self-rescue and buddy rescue to the DSO, or Instructional Personnel (see 1.6-1.7)
      i. The DSO and Instructional personnel can fulfill this requirement by teaching/evaluating rescue skills of other divers during courses, SCUBA skills checkouts and annual skills checkout
   IV. Bi-annually perform a SCUBA skill checkout with the DSO or Instructional Personnel, demonstrating the skills on 4.3 *Practical Requirements* B
      i. The DSO may require SCUBA skills checkout in accordance with 4.3 *Practical Requirements* G.II
   V. SCUBA skills checkouts and demonstration of rescue skills (A.IV & A.V) conducted at other Scientific Diving Program (e.g., NOAA) can be used to fulfill this requirement
      i. The diver must request the DSO from that institution to send a copy of the results to the A&M-SA DSO
B. In order to maintain the Depth Authorization divers must
   I. Log at least one dive during each 6-month period near the maximum depth
      i. Divers authorized beyond 130 feet may satisfy these requirements with

1. Dives ≥ 130 feet completed with the gear configuration and gasses similar to those the diver utilizes to complete dives deeper than 130 feet
2. Dives < 130 feet with planned decompression stops completed with the gear configuration similar to those the diver utilizes to complete dives deeper than 130 feet

C. Divers with more than 100 task loaded dives can fulfill A.III-IV in double the time
D. Divers fulfilling the requirements to maintain active status, but not to maintain the current depth authorization, will be authorized to the maximum depth to which the diver fulfills the requirements

Requalification of Authorization

A. Divers whose active Scientific Diver has lapsed due to the lack of activity may be required by
   I. If the lapse is less than 12 months, the diver may request active Scientific Diver status and depth authorization to the DSB in writing, with justification for the re-authorization
   II. If the lapse is more than 12 months, fulfilling the requirements on 4.2 *Scientific divers transferring into A&M-SA* A.III-IV
B. Divers whose depth authorization was downgraded in accordance with 4.6C due to the lack of activity
   I. May be re-authorized to the immediately previous depth authorization
      i. The diver must request the depth authorization to the DSB in writing, with justification for the re-authorization
      ii. The DSB may request a SCUBA skill checkout
   II. May be re-authorized to the maximum depth hold by the diver by
      i. If the depth authorization sought is ≤ 130 feet, completing a SCUBA skill checkout with the DSO demonstrating the skills on 4.3 *Practical Requirements* B
      iii. If the depth authorization sought by the diver is ≥130 feet, completing a SCUBA skill checkout with the DSO demonstrating the skills on 4.3 *Practical Requirements* B with the gear configuration to those the diver utilizes to complete dives deeper than 130 feet

iv. The DSO may require a SCUBA skills checkout in accordance with 4.3 Practical Requirements G.II
v. The DSB or DSO may have further requirements

4.7 Revocation of Authorization

A. An individual's scientific diver certification or authorization can be restricted or revoked with just cause by the DSB or the DSO. Examples of just cause include, but are not limited to
   I. Non-compliance to the A&M-SA Diving Standards for Underwater Operations
   II. Non-compliance with any pertinent regulation or laws
   III. Demonstration of poor judgment
   IV. Willful disobedience of verbal or written requests by those in charge of diving or vessel operations
B. All restrictions or suspensions will be documented on the diver's file, as well as reasons for reauthorization or rescission
   I. Only restrictions or suspensions considered wrongfully applied after DSB reconsideration may be removed from the diver's file
C. Restrictions or suspensions issued by the DSB may be rescinded only by the DSB, unless it authorized the DSO as part of the restriction/suspension
D. Restrictions or suspensions issued by the DSO may be rescinded by the DSO or the DSB
E. The DSB or the DSO who made the restriction decision must inform the diver in writing of the reason(s) for revocation
F. Following revocation, the diver may be reauthorized after complying with conditions the DSB may impose
G. The diver will be given the opportunity to present their case to the DSB for reconsideration
   I. At the diver's preference, the diver can present the case in writing or in person
   II. Witnesses can decide if they are willing to participate, if so, they can submit their observations in writing, or in person, at the witness discretion
      i. Each witness may request to remain anonymous

ii. Each witness presents in person, may request that specific persons are not present
iii. Each witness may request to communicate with a specific member of the DSB

H. Restrictions or suspensions must be proportionate to the cause
   I. The DSO and DSB has the mission to advance and facilitate safe and productive diving activities, as such, when appropriate, must prefer remediation actions such as requiring further training or practice
   II. Permanent restrictions or suspensions should be only use in extreme or recurring offenders
I. Also see 1.12 and 2.13 in this manual

Section 5. SCIENTIFIC DIVING MEDICAL STANDARDS

5.1 Medical Requirements

A. Each application for the Diving Program must be accompanied by a medical evaluation (Appendix 3-5)
   I- Medical evaluation must be completed by, or under the direction of, a licensed physician of the applicant-diver's choice, preferably one trained in diving/undersea medicine.
B. The diver should be free of any chronic disabling disease and any conditions contained in the list of conditions for which restrictions from diving are generally recommended (Appendix 3)
C. A&M-SA, through the DSO or DSB, must determine that divers have been declared by the examining medical authority to be fit to engage in diving activities
D. The DSO and/or the DSB may require follow-up with a specialist who is board certified in a specific and relevant specialty (e.g., hyperbaric and undersea medicine, pulmonology, cardiology) to review medical exams and/or applicants who have medical issues of special concern
E. The diver applicant will agree to release the medical information to the DSO and the DSB (Appendix 5b)
F. At the discretion of the DSO some medical conditions may be disqualifying for dive ratings in the Texas A&M University - San Antonio Dive Program, even if an examining physician approves the conditions. Applicants may appeal an adverse decision by the DSO to the Dive Safety Board by submitting a written appeal to the Chair of the DSB, which will then be evaluated at the next scheduled DSB meeting.

5.2 Frequency of Medical Evaluations

A. Initial medical evaluation, or equivalent medical evaluation, must be completed before an applicant/diver may begin any in-water activities
   I- Equivalent medical evaluation must meet all the following requirements
      i. The medical evaluation has been given within a) 5 years for applicants less than 40 years of age, b) 3 years for applicants between 40 and 59 years of age, c) 2 years for applicants 60 years of age or greater

ii. No disqualifying conditions were found
iii. The applicant has not had any major injury or illness, or any condition requiring hospital care since the date of the equivalent medical evaluation
iv. The University has obtained the results of that examination, and those have been reviewed and found satisfactory by the DSO or DSB

B. Periodic examinations are as follows
   I- Less than 40 years of age, at 5-years intervals
   II- Between 40 and 59 years of age, at 3-years intervals
   III- 60 years of age and greater, at 2-years intervals
C. Clearance to return to diving must be obtained from a physician following any major injury or illness, any condition requiring hospital care, or any condition requiring chronic medication.
   I- If the condition is pressure related, then the clearance to return to diving must come from a physician trained in diving medicine.

5.3 Information Provided Examining Physician

The applicant must provide a copy of the medical evaluation requirements of this standard, available on Appendices 3, 4, and 5, to the examining physician.

5.4 Content of Medical Evaluations

Medical examinations conducted initially, and at the intervals specified in Section ##.2, must consist of the following:

A. Medical history (Appendix 4)
B. Diving physical examination (Appendix 5). Modifications or omissions of required tests are not permitted
C. Applicant agreement for release of medical information to the Dive Safety Officer and the DSB (Appendix 5b)

5.5 Physician's Written Report

A. After any medical examination relating to the individual's fitness to dive it is the diver's responsibility to provide A&M-SA a written report signed by the examining or supervising physician stating the individual's fitness to dive, including any recommended restrictions or limitations.
B. It is the diver's responsibility to provide to the A&M-SA a written statement from the examining 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 DSO and/or DSB, and the diver's record and authorizations will be updated accordingly.
C. A copy of any physician's written reports will be made available to the individual.
D. The complete medical examination report (Appendices 4, 5 and 5b) will be reviewed by the DSO and/or DSB.

Section 6. NITROX DIVING

This section describes the requirements for authorization and use of NITROX during diving activities under the auspices of A&M-SA Dive Program. Nitrox is defined for these manual as breathing gas mixtures composed primarily of Nitrogen and Oxygen, but with Oxygen percentages greater than those in natural atmospheric air (O_2 >21%)

6.1 Requirements for Nitrox Authorization

Prior to authorization to use Nitrox, the following minimum requirements must be met

A. Divers enrolled in a University course that includes training on the use of Nitrox
    I- The instructor must be certified by an internationally recognized training agency as a Nitrox Instructor
B. Certified divers in the use of Nitrox by an internationally recognized training agency
    I- Submit to the DSO a copy of the certification
    II- Complete the *Diving Program Application* (Appendix 1) including relevant information

i. Divers already registered in the A&M-SA Dive program may update the Appendix I file with the relevant information to obtain Nitrox Authorization

C. The NITROX authorization will include the maximum fO_2 approved, which will be based on
   I- Limits on the diver's certification
   II- Approval by the DSO
D. Scientific Divers holding a Nitrox certification must demonstrate to the DSO to be sufficiently knowledgeable, skilled, and proficient in the theory and use of Nitrox for diving to receive authorization to use Nitrox

6.2 Training requirements

Courses including Nitrox training may do so using one of the following options

A. Under the auspices and standards of an internationally recognized diver training agency
B. Using the minimum guidelines presented by the most current version of the RSTC/WRSTC and/or ISO Nitrox diver training standards
   I- "Minimum Course Content for Enriched Air Nitrox Certification" - World Recreational SCUBA Training Council (WRSTC), www.wrstc.com
   II- "Recreational diving services - Requirements for training programs on enriched air nitrox (EAN) diving". ISO 11107:2009 - International Organization for Standardization (ISO), www.iso.org

Written Evaluation

A. Function, care, use, and maintenance of equipment cleaned for nitrox use.
B. Physical and physiological considerations of Nitrox diving (e.g., O_2 and CO_2 toxicity)
C. Diving regulations, procedures/operations, and dive planning as related to nitrox diving
D. Equipment marking and maintenance requirements
E. Dive table and/or dive computer usage
F. Calculation of MOD, EAD, and ppO_2
G. Other aspects of Nitrox diving as required by the DSB

Practical Evaluation

A. Oxygen analysis of Nitrox mixtures
B. Determination of MOD, oxygen partial pressure exposure, and oxygen toxicity time limits, for various nitrox mixtures at various depths
C. Determination of Nitrogen-based dive limits status by the following two methods
    I- EAD method using air dive tables
    II- Using nitrox dive tables
D. Nitrox dive computer use may be included
E. A minimum of two supervised open water dives using nitrox is required for authorization

6.3 Minimum Activity to Maintain Authorization

A. The diver should log at least one Nitrox dive per year
    I- Dives with TRIMIX or using a rebreather fulfill this requirement
B. Failure to meet the minimum activity level may be cause for restriction or revocation of Nitrox authorization
C. Divers whose active Nitrox has lapsed due to the lack of activity may be required to
    I- If the lapse is less than 12 months, the diver may request Nitrox re-authorization to the DSB in writing, with justification for the re-authorization
    II- If the lapse is more than 12 months, the diver must demonstrate to the DSO Knowledge of the topics required in 6.2 *Written evaluation* and *Practical evaluation*
        i. The DSO may decide if a dive is required
D. Divers with 100 dives or more utilizing NITROX can fulfill the requirements in A-C in double the time

6.4 Operational Requirements

A. Oxygen exposure limits are described in 2.4 *Number of dives and oxygen exposure*
    I- The maximum allowable exposure limit should be reduced in cases where cold or strenuous dive conditions, or extended exposure times are expected
B. Calculation of decompression status can be performed with

I- Air dive tables using the equivalent air depth (EAD) from an internationally recognized training agency
II- Nitrox tables from an internationally recognized training agency
III- Dive computer compatible with NITROX
  i. As part of the buddy check, divers must confirm that the computer is set to the correct NITROX mix being used
  ii. Divers must follow the manufacturer's instructions on use of NITROX
  iii. If the dive computer does not allow setting the maximum ppO_2, the diver must calculate the MOD manually
IV- Decompression planner software
V- Use of U.S. Navy tables require approval from the DSB

C. Mixing NITROX must be performed by qualified personnel on the gas blending method used
D. Equipment required for diving operations utilizing NITROX must comply with the requirements on section 3 in accordance with the fO2 to be used

Analysis verification and dive log by users

A. Prior to the dive, it is the responsibility of each diver to analyze the oxygen content of the SCUBA cylinder
B. Each diver must include the following information in their cylinders
  I- fO_2
  II- MOD
  III- Date of analysis
  IV- User's name or initials
C. Divers must report in their dive log fO_2 of nitrox used, if different than 21%

Section 7. MIXED GAS DIVING

This section describes the requirements for authorization with mixed gas diving during diving activities under the auspices of A&M-SA Dive Program. Mixed gas diving is defined as dives done while breathing gas mixes containing proportions greater than 1% by volume of an inert gas other than Nitrogen. Common examples of mixed gasses are HELIOX and TRIMIX

7.1 Requirements for Mixed Gas Diving Authorization

Prior to authorization to use mix gasses, the following minimum requirements must be met

A. NITROX authorization
B. Divers enrolled in a University course that includes training on the use of a mixed gas
    I- The instructor must be certified by an internationally recognized training agency as an Instructor for the gas mix to be taught
    II- University courses including the use of a mixed gas must fulfill the minimum theoretical and practical requirements described on 7.2
C. Certified divers in the use of mixed gas by an internationally recognized training agency fulfilling the minimum theoretical and practical requirements described on 7.2
    I- Submit to the DSO a copy of the certification
    II- Review the theoretical and practical requirements on 7.2
        i. Inform the DSO if any topic was not covered during the diver's course, if this is the case, the DSO will inform the diver in the next steps
    III-Complete the *Diving Program Application* (Appendix 1) including relevant information
        i. Divers already registered in the A&M-SA Dive program may update the Appendix I file with the relevant information to obtain Mixed Gas Authorization
D. The Mixed Gas authorization will include the minimum fO_2, and inert gasses approved, which will be based on
    I- Limits on the diver's certification

II- Approval by the DSO

E. Scientific Divers holding a Mixed Gas certification must demonstrate to the DSO to be sufficiently knowledgeable, skilled, and proficient in the theory and use of Mixed Gas for diving to receive authorization to use Mixed Gas

7.2 Training requirements

Theoretical requirements

A. Review of topics and issues previously outlined in Nitrox and required decompression diving training as pertinent to the planned operations
B. The use of helium or other inert gases, and the use of multiple decompression gases
C. Equipment configurations
D. Mixed gas decompression planning
E. Gas management planning
F. Thermal considerations
G. END determination
H. Mission planning and logistics
I. Emergency procedures
J. Mixed gas production methods
K. Methods of gas handling and cylinder filling
L. Oxygen exposure management
M. Gas analysis
N. Mixed gas physics and physiology

Practical requirements

A. Confined water session(s) in which divers demonstrate proficiency in required skills and techniques for proposed diving operations
B. A minimum of 6 open water training dives
C. At least one initial dive must be in 130 feet or less to practice equipment handling and emergency procedures
    I- Subsequent dives will gradually increase in depth, with a majority of the training dives being conducted between 130 feet and the planned operational depth
    II- Planned operational depth for initial training dives must not exceed 260 feet

III-Diving operations beyond 260 feet requires additional training dives

7.3 Minimum Activity to Maintain Authorization

A. The diver should log at least one mixed gas or decompression dive every 6 months
B. Failure to meet the minimum activity level may be cause for restriction or revocation of mixed gas authorization
C. Divers whose active mixed gas has lapsed due to the lack of activity may be required to
    I- If the lapse is less than 12 months, the diver may request mixed gas re-authorization to the DSB in writing, with justification for the re-authorization
    II- If the lapse is more than 12 months, the diver must demonstrate to the DSO Knowledge of the topics required in 7.2
        i. The DSO may decide if a dive is required
D. Divers with 100 dives or more utilizing mixed gas or decompression can fulfill the requirements in A-C in double the time

7.4 Operational Requirements

A. Oxygen exposure limits are described in 2.4 *Number of dives and oxygen exposure*
    I- The maximum allowable exposure limit should be reduced in cases where cold or strenuous dive conditions, or extended exposure times are expected
B. Divers decompressing on high-oxygen concentration mixtures (O_2 > 40%) must closely monitor one another for signs of acute oxygen toxicity
C. Calculation of decompression status can be performed with
    I- Air dive tables using the equivalent air depth (EAD) from an internationally recognized training agency
    II- Nitrox tables from an internationally recognized training agency
    III- Use of U.S. Navy tables
        i. The diver must understand the differences between dive tables from an internationally recognized training agencies and the U.S. Navy
    IV-Dive computer compatible with mixed gas
        i. As part of the buddy check, divers must confirm that the computer is set to the correct mixed gas mix being used
        ii. Divers must follow the manufacturer's instructions on use of mixed gas

iii. Divers must set the maximum ppO_2 on the computer, or the diver must calculate the MOD manually

D. Mixing gasses must be performed by qualified personnel on the gas blending method used
E. Equipment required for diving operations utilizing mixed gasses must comply with the requirements on section 3 in accordance with the fO2 to be used
F. Mission specific workup dives are recommended
G. Depending on the complexity of planned tasks it is recommended that one diver per team acts as a safety diver
   I- Does not have scientific tasks
   II- Has light/easy dive tasks
   III- Role of a safety diver can be done in a rotary basis between or within dives
H. The DSB or DSO may require F and G in order to approve a dive plan

Analysis verification and dive log by users

A. Prior to the dive, it is the responsibility of each diver to analyze the oxygen content of the SCUBA cylinder
B. Each diver must include the following information in their cylinders
   I- fO_2
   II- Inert gas used and their fractions
   III- MOD
   IV- Date of analysis
   V- User's name or initials
   VI- Divers must report in their dive log fO_2 and inert gas(ses) used, if different than air

7.5 Note on Inert Gasses

Inert gasses other than Nitrogen and Helium requires special authorization by the DSB and would require extensive evidence on their safety as a breathing gas for diving purposes. Projects requiring the use of breathing gasses containing other than Oxygen, Nitrogen, and Helium are recommended to contact the DSB early at the proposal stage, unless there is extensive evidence such gas mixtures will not be approved or will require the development of specific operational and training procedures

Section 8. STAGED DECOMPRESSION DIVING

This section describes the requirements for authorization with planned decompression stops during diving activities under the auspices of A&M-SA Dive Program. 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.

8.1 Requirements for Staged Decompression Diving Authorization

Prior to authorization to conduct Decompression diving, the following minimum requirements must be met

A. Nitrox authorization
B. Minimum of 50 logged dives
C. Demonstration of the ability to safely plan and conduct divers deeper than 100 feet
D. Divers enrolled in a University course that includes training on staged decompression
    I- The instructor must be certified by an internationally recognized training agency as a Decompression Instructor
    II- University courses including the use of staged decompression must fulfill the minimum theoretical and practical requirements described on 8.2
E. Certified divers on staged decompression by an internationally recognized training agency fulfilling the minimum theoretical and practical requirements described on 8.2
    I- Submit to the DSO a copy of the certification
    II- Review the theoretical and practical requirements on 8.2
        i. Inform the DSO if any topic was not covered during the diver's course, if this is the case, the DSO will inform the diver in the next steps
    III-Complete the *Diving Program Application* (Appendix 1) including relevant information
        i. Divers already registered in the A&M-SA Dive program may update the Appendix I file with the relevant information to obtain Mixed Gas Authorization

F. Scientific Divers holding a staged decompression certification must demonstrate to the DSO to be sufficiently knowledgeable, skilled, and proficient in the theory and use of decompression diving to receive authorization to conduct scientific dives requiring decompression

8.2 Training requirements

Training must be appropriate for the conditions in which dive operations are to be conducted

Theoretical requirements

A. Physics and physiology of decompression
B. Decompression planning and procedures
C. Gas management
D. Equipment configurations
E. Decompression methods
F. Emergency procedures, and omitted decompression
G. A minimum of 6 hours of theoretical training is required

Practical requirements

A. It is recommended that at least one training session be conducted in a pool or sheltered water setting, to cover:
   I- Equipment handling and familiarization
   II- Swimming and buoyancy control
   III-Gas consumption rates estimation
   IV-Emergency procedures
B. No training dives requiring decompression should be conducted until the diver has demonstrated acceptable skills under simulated conditions
C. At least 6 open-water training dives simulating/requiring decompression must be conducted, emphasizing planning and execution of required decompression dives, and including practice of emergency procedures
   I- At least 2 open-water training dives must require decompression
D. 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 bottle use as pertinent to planned diving operation
VI- Buddy skills
VII- Gas management
VIII- Task loading
IX- Emergency skills

8.3 Minimum Activity to Maintain Authorization

A. The diver should log at least one mixed gas or decompression dive every 6 months
B. Failure to meet the minimum activity level may be cause for restriction or revocation of stage decompression authorization
C. Divers whose active mixed gas has lapsed due to the lack of activity may be required to
    I- If the lapse is less than 12 months, the diver may request mixed gas re-authorization to the DSB in writing, with justification for the re-authorization
    II- If the lapse is more than 12 months, the diver must demonstrate to the DSO knowledge of the topics required in 8.2
        i. The DSO may decide if a series of progressive workup dives are required
D. Divers with 100 dives or more utilizing mixed gas or decompression can fulfill the requirements in A-C in double the time

8.4 Minimum Equipment Requirements

A. Cylinder valve and regulators 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. Cylinders with volume and configuration adequate for planned diving operations
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. Compass
E. Reel or spool of sufficient length for the planned dive

F. Redundancy in the following components
   I- Decompression schedule
   II- Dive timing device
   III- Depth gauges
   IV- Cutting devices
G. Dive computers compatible with decompression diving and the gasses used can be utilized
   I- Each dive computer will count as one item on F.1-III
H. Redundancy on Buoyancy Control Device is recommended

8.5 Operational Requirements

A. Oxygen exposure limits are described in 2.4 *Number of dives and oxygen exposure*
   I- The maximum allowable exposure limit should be reduced in cases where cold or strenuous dive conditions, or extended exposure times are expected
B. Divers decompressing on high-oxygen concentration mixtures (O_2 > 40%) must closely monitor one another for signs of acute oxygen toxicity
C. 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
D. Calculation of decompression status can be performed with
   I- Air dive tables using the equivalent air depth (EAD) from an internationally recognized training agency
   II- Nitrox tables from an internationally recognized training agency
   III- Use of U.S. Navy tables
      i. The diver must understand the differences between dive tables from an internationally recognized training agencies and the U.S. Navy
   IV- Dive computer compatible with mixed gas
      i. As part of the buddy check, divers must confirm that the computer is set to the correct mixed gas mix being used
      ii. Divers must follow the manufacturer's instructions on use of mixed gas
      iii. Divers must set the maximum ppO_2 on the computer, or the diver must calculate the MOD manually
E. The dive team must review emergency decompression procedure appropriate for the planned dive as part of the pre-dive briefing on each dive

F. Use of gases other than air must be in accordance with Sections 6 and 7
G. Use of additional Nitrox and/or high-Oxygen fraction decompression mixtures as travel and decompression gases to decrease decompression obligations is recommended
H. Use of alternate inert gas mixtures to limit narcosis is recommended for depths greater than 150 feet
I. The maximum depth for required decompression using air as the bottom gas is 185 feet
J. Mission specific workup dives are recommended
K. Depending on the complexity of planned tasks it is recommended that one diver per team acts as a safety diver
    I- Does not have scientific tasks
    II- Has light/easy dive tasks
    III-Role of a safety diver can be done in a rotary basis between or within dives
L. The DSB or DSO may require J and G to approve a dive plan

8.6 Complexity of scientific techniques

A. It is advisable (when possible) to master new scientific techniques (e.g., sampling, data gathering, equipment installation methods) in open water environments within non decompression limits utilizing the equipment configuration to be used with staged decompression before their application on dives requiring decompression stops
B. Complexity of scientific techniques must be accordingly to the experience of the scientific decompression diver
    I- Complexity of scientific tasks should only increase in accordance with the diver experience and comfort levels
C. The Lead Diver must remind the dive team that team safety must always be prioritized
D. Dive plan approval requires proof of experience accordingly with the proposed tasks

Section 9. SCIENTIFIC CAVERN AND CAVE DIVING

This section describes the requirements for authorization of scientific cavern and cave diving during diving activities under the auspices of A&M-SA Dive Program

9.1 Definitions

A. A dive team must be considered to be cave or cavern diving if at any time during the dive they find themselves in a position where they cannot complete a direct, unobstructed ascent to the surface because of rock formations. In addition to blocking direct access to surfacing, underwater caves have additional environmental hazards including but not limited to
   - I- The absence of natural light
   - II- Current or flow that varies in strength and direction
     - i. Of particular note is a condition known as siphoning. Siphoning caves have flow or current directed into the cave
       1. This can cause poor visibility as a result of mud and silt being drawn into the cave entrance
       2. Gas management must be planned accordingly, since traveling into the cave would require less gas consumption than traveling out
       3. Strong enough current may prevent divers to swim out of the cave
     - ii. Special considerations must be included in the risk assessment and management plan within the dive plan if siphoning is expected
   - III- The presences of silt, sand, mud, clay, etc. that can cause visibility to be reduced to zero in a very short time
   - IV- Restrictions – Any passage through which two divers cannot easily pass side by side while sharing air make air sharing difficult
   - V- Cave-Ins – Cave-Ins are a normal part of cave evolution; however, experiencing a cave-in during diving operations is extremely unlikely
   - VI- Presence of a halocline. Mix of water layers with different salinities will reduce the visibility of the divers, especially those following another diver

B. For diving purposes, a cavern is defined as an overhead environment within the limits of light penetration

C. For diving purposes, a cave is defined as an overhead environment beyond the limits of light penetration

9.2 Requirements for Cavern and Cave Diving Authorization

Prior to authorization to perform cavern or cave diving, the following minimum requirements must be met

A. Divers enrolled in a University course that includes training on cavern or cave diving techniques
   I- The instructor must be certified by an internationally recognized training agency as an Instructor for the cavern or cave diving
   II- University courses including the use of a cavern or cave diving techniques must fulfill the minimum theoretical and practical requirements described on 9.3
   III-Cave diving courses can be taught concurrently with staged decompression diving
      i. All requirements for both courses must be met

B. Certified divers in cavern or cave diving techniques by an internationally recognized training agency fulfilling the minimum theoretical and practical requirements described on 9.3
   I- Submit to the DSO a copy of the certification
   II- Review the theoretical and practical requirements on 9.3, as appropriate
      i. Inform the DSO if any topic was not covered during the diver's course, if this is the case, the DSO will inform the diver in the next steps
   III-Complete the *Diving Program Application* (Appendix 1) including relevant information
      i. Divers already registered in the A&M-SA Dive program may update the Appendix I file with the relevant information to obtain Cavern or Cave Diving Authorization

C. Required open water experience
   I- For cavern diving, 50 dives
   II- For cave diving, 100 dives

D. The authorization will include if the diver is approved to conduct cavern diving or both cavern and cave diving, which will be based on

I- Diver's certification
II- Approval by the DSO

E. Scientific Divers holding a cavern or cave diving certification must demonstrate to the DSO that they possess the proper attitude, judgment, and discipline to safely conduct cave and cavern diving in the context of planned operations to receive authorization to dive in caverns and/or caves
F. As stated on 2.4 *Divers under multiple modes,* cavern or cave dives that also involve staged decompression, rebreathers, and/or mixed gas diving, all requirements for each of the relevant diving techniques, modes, or gases must be met
G. If a conflict exists between this section and other sections in this *Manual*, the information set forth in this section only takes precedence when the scientific diving being conducted takes place wholly or partly within an underwater cave or cavern environment

9.3 Training

Theoretical requirements

A. For cavern diving
   I- Policy for diving overhead environments
   II- Environment and environmental hazards
   III- Accident analysis
   IV- Psychological considerations
   V- Equipment considerations
   VI- Communications
   VII- Diving techniques
      i. Body control
      ii. Navigation and guidelines
      iii. Entry and exit protocols (right of way)
      iv. Use of line markers
      v. Line systems applicable to the area and/or cave system
   VIII- Dive planning
      i. Rule of sixths
      ii. Rule of thirds

iii. Gas matching procedures and management to include dissimilar volume
iv. Decompression theory
v. Dive tables
vi. Cave geology
vii. Cave hydrology
viii. Cave biology
ix. Emergency procedures
x. Mixed mode diving (recommended)

B. For cave diving
I- All topics required for cavern diving
II- Specific equipment considerations
III- Specific emergency procedures
IV- Line jumps
V- Circuits
VI- Cave diving etiquette

C. For rebreather cavern or cave diving
I- All topics on A or B, accordingly with the certification
II- Specific equipment considerations
III- Specific emergency procedures
IV- Off-board bailout
V- Mixed mode diving (recommended)

Practical land drills requirements

A. For cavern and cave diving on OC and CC
I- Line reel use
II- Techniques and considerations for laying a guideline
III- Guideline following
IV- Buddy communication
V- Team positioning for normal entry and exit
VI- Zero visibility drills
i. Line reel use
ii. Line and line markers identification and following
VII- Team positioning for emergency situations

Practical in-water requirements

A. For cavern diving
   - I- A minimum of four cavern dives, preferably to be conducted in a minimum of two different caverns
   - II- Safety drill (s-drill) – performed on every dive
   - III- Review of dive plan and turn pressures
   - IV- Essential gear identification, positioning, and function check
   - V- Proper valve position check
   - VI- Bubble check
   - VII- Proper buoyancy compensator use
   - VIII- Proper trim and body positioning
   - IX- Hovering and buoyancy with hand tasks
   - X- Specialized propulsion techniques and anti-silting techniques
   - XI- Proper light and hand signal use
   - XII- Proper reel and guideline use
   - XIII- Ability to deploy a primary reel and tie into a main line under different conditions (flow, visibility, bottom/silt, etc.)
   - XIV- Proper line placement and etiquette
   - XV- Ability to properly critique their dives and performance
   - XVI- Line reel use
   - XVII- Buddy communication
   - XVIII- Line and line markers identification and following
   - XIX- Emergency procedures
     - i. Team positioning for emergency situations
     - ii. Gas sharing while following guideline (conducted with and without visibility, as donor and receiver)
   - XX- Valve manipulation
   - XXI- Proper attitude, judgment, and discipline to safely conduct dives in an overhead environment
   - XXII- Surveying (recommended)
   - XXIII- Zero visibility drills (recommended)

B. For cave diving

I- A minimum of 12 cave dives, preferably to be conducted in a minimum of four different cave sites with differing conditions
II- All skills required for cavern diving
III- Proper use of safety reel
IV- Proper use of jump/gap reel(s)
V- Zero visibility drills
VI- Emergency procedures
    i. Lost line
    ii. Gas sharing in a minor restriction using a single file method as donor and receiver
VII- Use of drop/stage cylinders (optional)
    i. Proper placement and retrieval of cylinder(s) with minimal disturbance of environment and visibility
    ii. Ability to deploy and retrieve cylinders with minimal loss of forward progress

C. For rebreather cavern or cave diving
    I- All skills on A or B, accordingly with the certification
    II- Bail out procedures

9.4 Minimum Equipment Requirements

Equipment used for cave or cavern diving is based on the concept of redundancy. Redundant diving equipment must be carried whenever the planned penetration distances are such that an emergency swimming ascent is not theoretically possible

A. For cavern and cave diving on OC and CC
    I- Buoyancy Control Device
    II- Dive timing device
    III- Depth gauges
    IV- Use of dive computer is recommended (fulfills II, III, and VI)
    V- Redundancy on mask and equipment I-IV is preferred
    VI- Waterproof dive tables
    VII- Slate and pencil
    VIII- Primary light

IX- Two secondary lights
X- Two cutting devices
XI- One primary reel of at least 350 feet (100 m) for each team
XII- SMB and snorkel are not required

B. For cavern diving
   I- A single cylinder with adequate volume and configured to allow divers to exit from farthest/deepest penetration while supporting self and dive buddy
   II- Standard OC regulator configuration
C. For cave diving
   I- Redundant cylinder configuration with adequate volume and configured to allow divers to exit from farthest/deepest penetration while supporting self and dive buddy. Cylinders must comply with one of the following
      i. Have a dual orifice isolation valve manifold (e.g., backmount configuration)
      ii. Independent systems (e.g., sidemount configuration)
   II- Two completely independent regulators appropriate to the redundant cylinder configuration use (I)
      i. Submersible pressure gauge(s) allowing the monitoring of gas pressure on all cylinders under normal operations
      ii. At least one low pressure inflator hose for the BCD
   III- The cylinder/regulator configuration must allow effective emergency gas sharing in the intended environment
   IV- Safety reel with at least 150 feet (45 m) of line
   V- Line Markers
D. For rebreather cavern or cave diving
   I- All equipment on A, and applicable equipment on B or C
   II- Rebreather
   III- Off-board/bailout gas supply of sufficient volume and configured to allow each diver to exit from farthest/deepest penetration
   IV- Team bailout configuration is not acceptable

9.5 Operational Requirements

A. Cavern and cave diving

Dive Program

I- Dive teams must perform a safety drill prior to each dive that includes
   i. Equipment check
   ii. Gas management
   iii. Dive objectives

II- Pre-dive briefing must include
   i. Review emergency procedures appropriate for the planned dive
   ii. Navigation information
   iii. Information on the dive site

III- Each team within the overhead zone must utilize a continuous guideline appropriate for the environment leading to a point from which an uninterrupted ascent to the surface may be made
   i. If a task requires a diver to briefly and shortly separate from the guideline further than the diver's armlength, either
      1. A temporal line should be deployed
      2. If conditions allow it, a diver must hold the line and keep a direct line sight on the other diver

IV- Gas management must be appropriate to meet planned operational requirements and foreseeable emergency situations
   i. Must consider special considerations for the specific environment, tasks, and technologies use

V- The entire dive team is to immediately terminate the dive whenever any dive team member calls (terminates) the dive

VI- Dive buddy teams are limited to three divers
   i. If a task requires more than three divers, multiple dive buddy teams can work together, but all dive planning must be done considering dive buddy teams of 2-3 divers

VII- Mission specific workup dives are recommended

VIII- Depending on the complexity of planned tasks it is recommended that one diver per team acts as a safety diver
   i. Does not have scientific tasks
   ii. Has light/easy dive tasks
   iii. Role of a safety diver can be done in a rotary basis between or within dives

IX- The DSB or DSO may require VII and VIII in order to approve a dive plan

B. Cavern diving
   I- Divers certified on cave diving techniques must follow the requirements for cave divers, including the use of cave diving equipment, to conduct a cavern dive
   II- Fulfill all requirements on A
   III- Must be always conducted during the daytime within the limits of light penetration
   IV- Maximum penetration into the overhead environment allowed is 200 feet (60m)
   V- Penetration is limited to 1/3 of a single diving cylinder or 1/6 if using double cylinders
   VI- No restrictions
   VII- Removal of life support equipment in the overhead environment is prohibited
C. Cave diving
   I- Fulfill all requirements on A
   II- Penetration is limited to 1/3 of a single diving cylinder

9.6 Complexity of scientific techniques

A. It is advisable (when possible) to master new scientific techniques (e.g., sampling, data gathering, equipment installation methods) in open water environments utilizing the equipment configuration to be used in the overhead environment before their application on cavern/caves
B. Complexity of scientific techniques must be accordingly to the experience of the scientific cavern/cave diver
   I- It is advisable that new scientific cavern/cave divers participate as observers/safety divers in overhead environments before conducting scientific tasks
   II- Complexity of scientific tasks should only increase in accordance with the diver experience and comfort levels
C. The Lead Diver must remind the dive team that team safety must always be prioritized

D. Dive plan approval requires proof of experience accordingly with the proposed tasks

Section 10. REBREATHERS

This section describes the requirements for authorization of diving activities utilizing rebreather technology under the auspices of A&M-SA Dive Program

10.1 Definitions

A. Rebreathers are defined as any device that recycles some or all the exhaled gas in the breathing loop and returns it to the diver
   I- Rebreathers maintain levels of Oxygen and carbon dioxide that support life by metered injection of Oxygen and chemical removal of Carbon dioxide. These characteristics fundamentally distinguish rebreathers from open-circuit life support systems, in that the breathing gas composition is dynamic rather than fixed
B. There are three main classes of rebreathers
   I- Oxygen Rebreathers: Oxygen rebreathers recycle breathing gas, consisting of pure oxygen, replenishing the oxygen metabolized by the diver
      i. Oxygen rebreathers are generally the least complicated design but are limited in depth of use due to the physiological limits associated with Oxygen toxicity
   II- Semi-Closed Circuit Rebreathers: Semi-closed circuit rebreathers (SCR) recycle the majority of exhaled breathing gas, venting a portion into the water and replenishing it with a constant or variable amount of a single oxygen-enriched gas mixture
      i. Gas addition and venting is balanced against diver metabolism to maintain safe Oxygen levels
   III-Closed-Circuit Rebreathers: Closed-circuit mixed gas rebreathers (CCR) recycle all the exhaled gas
      i. Systems are equipped with two cylinders; one with Oxygen, the other with a diluent gas source used to make up gas volume with depth increase and to dilute Oxygen levels. CCR systems operate to maintain a constant ppO_2 during the dive, regardless of depth
C. Rebreathers are further classified on the type of control technology for the addition of Oxygen

I- Mechanical rebreathers (e.g., mCCR) rely on mechanical Oxygen addition and diver monitoring to control oxygen partial pressure (ppO2)

II- Electronic rebreather (e.g., eCCR) replace metabolized oxygen via an electronically controlled valve, governed by oxygen sensors

i. Depending on the design, manual oxygen addition may be available on eCCR units as a diver override, in case of electronic system failure

10.2 Requirements for Rebreather Diving Authorization

Prior to authorization to dive utilizing a rebreather, the following minimum requirements must be met

A. Active Scientific diver status with at least a 60 feet depth authorization

B. NITROX training

I- Training in use of mixtures containing 40% to 100% oxygen may be required, as needed for the planned application and rebreather system

C. Divers enrolled in a University course that includes training on rebreather diving techniques

I- The instructor must be certified by an internationally recognized training agency as an Instructor for the brand and model of the rebreather, and where applicable the individual being authorized should be authorized as an instructor by the respective rebreather manufacturer or their designee

II- University courses including the use of rebreather diving techniques must fulfill the minimum theoretical and practical requirements described on 10.3

D. Certified rebreather divers by an internationally recognized training agency following or exceeding The Rebreather Education & Safety Association (RESA) standards

I- Submit to the DSO a copy of the certification

II- Review the theoretical and practical requirements on 10.3-10.4, as appropriate

i. Inform the DSO if any topic was not covered during the diver's course, if this is the case, the DSO will inform the diver in the next steps

III-Complete the *Diving Program Application* (Appendix 1) including relevant information

i. Divers already registered in the A&M-SA Dive program may update the Appendix I file with the relevant information to obtain Rebreather Diving Authorization

E. Completion of a minimum of 50 open-water dives on open circuit SCUBA
F. As stated on 2.4 *Divers under multiple modes,* rebreather dives that also involve staged decompression, cavern/cave, and/or mixed gas diving, all requirements for each of the relevant diving techniques, modes, or gases must be met
G. Scientific Divers holding a rebreather certification must demonstrate to the DSO that they possess the proper attitude, judgment, and discipline to safely conduct rebreather diving in the context of planned operations to receive authorization to dive utilizing a rebreather and authorization under different diving modes
   I- Divers must complete at least 6 dives and 3 hours after training dives prior to be candidates to receive scientific rebreather diver authorization for open water environments
   II- Divers must complete at least 30 hours after training dives prior to be candidates to receive scientific rebreather diver authorization for overhead environments
   III- Depth authorization would depend on the diver's rebreather experience and would be discussed in a case-by-case basis
      i. Divers are encouraged to discuss with the DSO the depth authorization seek in accordance with the project needs and diver's experience
   IV- Initial depth authorization will not be deeper than the current depth authorization in Open Circuit. Depth progression will follow the procedure described on 4.5 *Scientific Diving depth ratings and progression to the next level*

10.3 Rebreather Entry Level Training

A. Specific training requirements for use of each rebreather model must be defined by DSB on a case-by-case basis
   I- Training must include factory-recommended requirements but may exceed this to prepare for the type of mission intended (e.g., staged decompression or heliox/trimix CCR diving)

II- Training must meet the standards set by The Rebreather Education & Safety Association (RESA)

B. The training area for O_2 rebreather should not exceed 20 feet (6 m) in depth
C. Entry level CCR and SCR training is limited in depth of 130 feet
D. Entry level CCR and SCR training is limited to Nitrogen/Oxygen breathing gases
E. Divers at the CCR and SCR entry level may not log dives that require a single decompression stop longer than 10 minutes
F. Maximum student/instructor ratio is 4 to 1
    I- This ratio is to be reduced as required by environmental conditions or operational constraints
G. Upon completion of practical training, the diver must demonstrate proficiency in pre-dive, dive, and post-dive operational procedures for the particular model of rebreather to be used
H. Supervised dives target activities associated with the planned science diving application
    I- Supervisor for these dives is the DSO or designee, experienced with the make/model rebreather being used

Theoretical entry level requirements

A. History of technology
B. Medical & physiological aspects of:
    I- Oxygen toxicity
    II- Chemical burns & caustic cocktail
    III- Hypoxia – insufficient O_2
    IV- Hyperoxia-induced myopia
    V- Hypercapnia – excessive CO_2
    VI- Arterial gas embolism
    VII- Middle ear Oxygen absorption syndrome (Oxygen ear)
    VIII- Hygienic concerns
    IX- Inert gas absorption & decompression sickness
    X- CO_2 retention
C. System design, assembly, and operation, including:
    I- Layout and design

II- Oxygen control systems
III- Diluent control systems (if applicable)
IV- Use of checklists
V- Complete assembly and disassembly of the unit
VI- Canister design & proper packing and handling of chemical absorbent
VII- Decompression management and applicable tracking methods
VIII- Oxygen and high-pressure gas handling and safety
i. Fire triangle
IX- Filling of cylinders
X- Pre-dive testing & trouble shooting
XI- Post-dive break-down and maintenance
XII- Trouble shooting and manufacturer authorized field repairs
XIII- Required maintenance and intervals
XIV- Manufacturer supported additional items (if applicable)

D. Dive planning:
I- Operational planning
II- Gas requirements
III- Oxygen exposure and management
IV- Oxygen metabolizing calculations
V- Scrubber limitations
VI- Mixed mode diving (buddies using different dive modes)
VII- Mixed platform diving (buddies using different rebreather platforms)
VIII- Gas density calculations (if applicable)

E. Problem Recognition & Emergency Procedures:
I- Applicable open circuit emergency procedures for common gear elements
II- Partially flooded loop
III- Fully flooded loop
IV- Recognizing hypercapnia signs and symptoms in self or buddy
V- Loss of buoyancy
VI- Exhausted oxygen supply
VII- Gas sharing
VIII- Diver assists and diver rescue

IX- Other problem recognition and emergency procedures specific to the particular unit, environment, or diving conditions

X- The following that applies to the specific rebreather model

i. Loss of electronics
ii. Cell warnings
iii. Battery warnings
iv. High O_2 warning
v. Low O_2 warning
vi. High CO_2 warning
vii. Recognizing issues as indicated by onboard scrubber monitors
viii. Excluded O_2 cell(s)
ix. Loss of Heads-Up Display (HUD)
x. Diluent manual add button not functioning
xi. O_2 manual add button not functioning
xii. Exhausted diluent supply
xiii. Lost or exhausted bailout
xiv. Handset not functioning
xv. Solenoid stuck open
xvi. Solenoid stuck closed
xvii. ADV stuck open
xviii. ADV stuck closed
xix. Isolator valve(s) not functioning
xx. Oxygen sensor validation
xxi. CO_2 sensor validation
xxii. SCR mode

Practical entry level requirements

A. Minimum underwater requirements are

I- Pool/confined water: 1 dive, 90 minutes

II- Open water

i. Oxygen rebreather and SCR: 4 dives, 120 minutes cumulative
ii. CCR: 8 dives, 380 minutes cumulative

III- Supervised dives

i. Oxygen rebreathers: 2 dives, 120 minutes cumulative
ii. SCR: 4 dives, 120 minutes cumulative
iii. CCR: 4 dives, 240 minutes cumulative

B. Demonstrated skills must include, at a minimum:
I- Use of checklists
II- Carbon dioxide absorbent canister packing
III- Supply gas cylinder analysis and pressure check
IV- Test of one-way valves
V- System assembly and breathing loop leak testing
VI- In-water bubble check
VII- Proper buoyancy control during descent, dive operations, and ascent
VIII- System monitoring & control during descent, dive operations, and ascent
IX- Proper interpretation and operation of system instrumentation
X- Proper buddy contact and communication
XI- Use of a line reel or spool to deploy an SMB from planned dive depth and while controlling buoyancy in the water column
XII- Proper management of line reel or spool, and SMB during ascents and safety or required stops
XIII- Unit removal and replacement on the surface
XIV- The following that applies to the specific rebreather model
i. Oxygen control system calibration
ii. Proper pre-breath procedure

C. Bailout and emergency procedures for self and buddy, including:
I- System malfunction recognition and solution
II- Absorbent canister failure
III- Alternate bailout options
IV- Manipulation of onboard and off board cylinder valves
V- The following that applies to the specific rebreather model
i. Manual system control
ii. Flooded breathing loop recovery
iii. Manipulation of bailout cylinders (removal, replacement, passing and receiving while maintaining buoyancy control)

iv. Manipulation of quick disconnects, isolator valves, and manual controls specific to the unit and gear configuration

D. Proper system maintenance, including:
   I- Breathing loop disassembly and disinfection
   II- Trouble shooting and manufacturer authorized field repairs
   III- The following that applies to the specific rebreather model
      i. Oxygen sensor replacement
      ii. CO_2 sensor replacement
      iii. Battery removal and replacement or recharging
E. Other tasks as required by specific rebreather models

10.4 Decompression, Normoxic, and Hypoxic Mix Training

Prerequisites

A. Required Decompression and Normoxic Training (B & C) may be taught separately or combined
B. Required decompression: Minimum 25 rebreather dives and 25 cumulative hours
C. Mixed Gas
   I- Normoxic Mixes: Minimum 25 rebreather dives and 25 cumulative hours
   II- Hypoxic Mixes
      i. Rebreather decompression certification
      ii. Normoxic certification
      iii. Minimum 25 decompression rebreather dives and 40 cumulative hours on dives requiring decompression
D. The instructor must be certified by an internationally recognized training agency as an CCR/SRC required decompression and/or Normoxic and/or Hypoxic Mix instructor for the brand and model of the rebreather, and where applicable the individual being authorized should be authorized as an instructor by the respective rebreather manufacturer or their designee
E. Maximum student/instructor ratio is 2 to 1
   I- This ratio is to be reduced as required by environmental conditions or operational constraints

F. Upon completion of practical training, the diver must demonstrate proficiency in pre-dive, dive, and post-dive operational procedures for the particular model of rebreather to be used
G. Supervised dives target activities associated with the planned science diving application. Supervisor for these dives is the DSO or designee, experienced with the make/model rebreather being used

Theoretical requirements

A. All modes
   I- Review of applicable subject matter from previous training
   II- Medical & physiological aspects of:
      i. Hypercapnia, hypoxia, hyperoxia
      ii. Oxygen limitations
      iii. Nitrogen limitations
   III-System design, assembly, and operation, including:
      i. Gear considerations and rigging
      ii. Gas switching
   IV-Dive planning:
      i. Decompression calculation
      ii. Gradient Factors
      iii. Scrubber duration and the effects of depth on scrubber function
      iv. Gas requirements including bailout scenarios
      v. Bailout gas management – individual vs team bailout

      NOTE: Team bailout is not accepted on dives under the A&M-SA auspices

      vi. Gas density calculations
      vii. Operational Planning
   V- Problem Recognition & Emergency Procedures:
      i. Applicable open circuit emergency procedures for common gear elements
      ii. Flooded loop
      iii. Cell warnings
      iv. Battery warnings
      v. Hypercapnia, hypoxia, hyperoxia

B. Normoxic and/or hypoxic mixes
   I- Medical & physiological aspects of:
      i. Helium absorption and elimination
      ii. High Pressure Nervous Syndrome (HPNS) – Only hypoxic mixes
   II- Dive planning:
      i. Equivalent narcosis depth theory
      ii. Gas selection, gas mixing and gas formulas

Practical requirements

A. All modes
   I- Proper demonstration of applicable skills from previous training
   II- Proper manipulation of DSV and/or BOV
   III- Proper descent and bubble check procedures
   IV- Proper monitoring of setpoint switching and ppO_2 levels
   V- Proper interpretation and operation of system instrumentation
   VI- System monitoring & control during descent, dive operations, and ascent
   VII- Demonstrate buoyancy control; ability to hover at fixed position in water column without moving hands or feet
   VIII- Demonstrate controlled ascent with an incapacitated diver including surface tow at least 30 meters / 100 feet with equipment removal on surface, in water too deep to stand
   IX- Onboard and off board valve manipulation for proper use, and reduction of gas loss
   X- Diagnosis of and proper reactions for
      i. Flooded absorbent canister
      ii. CO_2 breakthrough
      iii. Cell errors
      iv. Low oxygen drills
      v. High Oxygen Drills
      vi. Flooded loop
      vii. Electronics and battery failure
   XI- Properly execute the ascent procedures for an incapacitated dive buddy
   XII- Proper buddy contact and communication

XIII- Use of a line reel or spool to deploy an SMB during
   i. Planned dive depth and while controlling buoyancy in the water column
   ii. Ascents and safety or required stops

XIV- Demonstrate the ability to
   i. Maintain minimum loop volume
   ii. Perform simulated decompression stops at pre-determined depths for scheduled times
   iii. Perform decompression stops at pre-determined depths for scheduled times
   iv. Demonstrate appropriate reaction to simulated free-flowing deco regulator
   v. Gas share of deco gas for at least 1 minute
   vi. Complete bailout scenarios from depth to include decompression obligation on open circuit

XV- If applicable
   i. Demonstrate the ability to manually change setpoint and electronics settings during the dive
   ii. Operation in semi-closed mode
   iii. Demonstrate ability to pass and receive multiple bailout/decompression cylinders or bailout rebreather while maintaining position in the water column

B. Required decompression
   I- Demonstrate comfort swimming on surface and at depth carrying a single bailout/decompression cylinder/bailout rebreather
   II- Demonstrate ability to pass and retrieve a single bailout/decompression cylinder or bailout rebreather while maintaining position in the water column

C. Normoxic and/or hypoxic mixes
   I- Demonstrate Oxygen rebreather mode at appropriate stop depth

10.5 Rebreather Crossover Training

A. Crossover training must follow the rebreather manufacturer's recommendations
B. Crossover training to a new rebreather platform requires a minimum of 4 training dives for a minimum cumulative dive time of 240 min

C. Advanced level certification on a new rebreather platform may be awarded upon successful demonstration of required skills using the new platform

10.6 Minimum equipment requirements

Minimum rebreather requirements

A. All types of rebreathers can be potentially used during A&M-SA diving operations; however, they need to be pre-approved by
   I- The DSO, if they are certified for a unit of the same brand and model, or a model using a similar technology
   II- The DSB
   III- It is recommended that divers interested in a specific model seek approval before purchasing the unit or seek training
B. In general, rebreathers used at A&M-SA require
   I- Work of breathing (WOB) and scrubber duration for the model have undergone independent 3rd party testing
   II- Minimum training following or exceeding the Rebreather Education & Safety Association (RESA) standards must be available
   III- It is recommended that rebreathers meet quality control/quality assurance protocols of the International Organization for Standardization (ISO) requirements: ISO 9004:2009 or the most current version and/or have successfully completed the CE (Conformité Européenne) certification
   IV- It is recommended that the selected rebreather has been widely use in similar or more challenging conditions to the proposed dives
   V- The DSB may require supporting information to the manufacturer prior to its approval, including but not limited to
      i. Third-party testing details and results
      ii. Quality Control/Quality Assurance protocols
C. Rebreather modifications (including consumables and operational limits) that deviate from or are not covered by manufacturer documentation should be discussed with the manufacturer and approved by the DSB prior to implementation
D. Rebreathers not available in the market, or not fulfilling the characteristics described above would most likely not approved. DSB approval would require

extensive information demonstrating the safety of the rebreather and why available units are not more appropriate for the type of diving proposed

Equipment Maintenance Requirements

A. The DSB or their designee will establish policies for the maintenance of rebreathers and related equipment under A&M-SA auspices
B. Rebreathers should be maintained in accordance with manufacturer servicing recommendations
C. Field repairs and replacement of components covered in rebreather diver training is not considered annual maintenance and may be performed by the rebreather diver in accordance with DSB policy
D. A maintenance log will be kept
    I- University owned equipment logs will be under the responsibility of the DSO
    II- Diver's own equipment logs will be the responsibility of the diver
    III- Maintenance logs will minimally include
        i. Date of service
        ii. Service performed
        iii. Individual or company performing service

Diver's equipment requirements

A. DSB approved rebreather (make and model)
    I- Compatible dive computer connected to the rebreather
    II- Approved CO_2 absorbent and other consumables
B. BCD capable of floating a diver with a flooded loop and/or dry suit at the surface
C. Bailout gas supply of sufficient volume for planned diving activities
D. Bottom timer, depth gauge, and dive tables (can be replaced by E)
E. Secondary dive computer with rebreather/bailout capabilities
F. Cutting device
G. SMB and line reel or spool with sufficient line for the planned dive
H. Access to an oxygen analyzer
I. For dives in overhead environments
    I- SMB is not required
    II- Extra mask is recommended

10.7 Operational Requirements

Dive Plan

In addition to standard dive plan components, at a minimum all dive plans that include the use of rebreathers must include:

A. Information about the specific rebreather model(s) to be used
B. Type of CO_2 absorbent material
C. Composition and volume(s) of supply gasses
D. Bailout procedures
E. Rebreather's model specific risks identification and mitigation (e.g., using rebreathers under conditions where vibration or pulsating water movement could affect electronics or control switches and systems)
F. Pre-operation workup dives, including review and practice of emergency recognition and response skills, and management of task loading are required for operations defined by the DSB as beyond the scope of normal operating conditions
G. Mission specific workup dives are recommended
H. Depending on the complexity of planned tasks it is recommended that one diver per team acts as a safety diver
    I- Does not have scientific tasks
    II- Has light/easy dive tasks
    III-Role of a safety diver can be done in a rotary basis between or within dives
I. The DSB or DSO may require G and H in order to approve a dive plan
J. It is recommended that dive plans include alternate plans on Open Circuit to have flexibility in the field
K. Other specific details as required by the DSB and DSO

Pre- and post- dive procedures

A. All manufacturers' guidelines for the specific rebreather model must be met
    I- If policies in this manual conflict with the manufacturer's guidelines the diver must choose the most conservative approach and notify the DSO
B. Rebreather divers must have and follow pre- and post- dive model specific checklist prior to diving operation
    I- Checklist must be in accordance with the manufacturer's guidelines

II- The DSB and DSO have the right to add steps to the checklist

III-At minimum checklist must include

i. All gases are programmed in the dive computer (CC and BO)
ii. Minimum battery voltage prior the dive
iii. Time available of CO_2 scrubber
iv. Validation/calibration of O_2 cells
v. Negative/positive test

C. Pre-breathing of rebreathers must be performed in accordance with manufacturer's guidelines
   I- If pre-breathing is not required by the manufacturer, the diver must discuss with the DSO the reasoning behind pre-breathing, after this discussion the DSO will inform if pre-breathing would be required for a specific rebreather model and/or type of diving operation
   II- Pre-breathing must always be performed in the close presence of another diver from the dive team who is briefed in the procedure and emergency response
D. Divers must disinfect rebreathers (e.g., loop and counterlung(s)) in accordance with the manufacturer's guidelines
   I- At minimum, every three days of diving, and after the last day of a field campaign
   II- Prior to returning university own rebreathers

Dive procedures

A. All manufacturers' guidelines for the specific rebreather model must be met
   I- If policies in this manual conflict with the manufacturer's guidelines the diver must choose the most conservative approach and notify the DSO
B. Maximum operation depth of a specific rebreather would be in accordance with the manufacturer's specifications and DSB/DSO approval
C. Periodic field validation and calibration of oxygen cells should be conducted per following the manufacturer's guidelines or DSB designated procedure
   I- Accepted methods for validation include
      i. A pre-dive linearity test prior the first dive of a diving campaign, and at least every five days

ii. Briefly increasing the ppO_2 to 1.6 by flushing the loop with oxygen
   1. The diver must notify the dive buddy before starting this procedure
   2. It must be conducted at no more than 20 ft (6 m) depth at the end of the dive, after all decompression and safety stops have been finalized
   3. The diver must pay especial attention to oxygen exposure prior to conducting this test

D. Particular attention should be paid to using rebreathers under conditions where heavy physical exertion is anticipated.
E. Respired gas densities should be less than 5.2 g/L and should not exceed 6.2 g/L under normal circumstances
   I- This is based on Anthony and Mitchell. 2016. Respiratory physiology of rebreather diving. In: Pollock NW, Sellers SH, Godfrey JM, eds. Rebreathers and Scientific Diving. Proceedings of NPS/NOAA/DAN/AAUS June 16-19, 2015 Workshop. Durham, NC. 66-79
   II- MOD of air as rebreather diluent is 128 ft (39 m)
F. User replaceable consumable rebreather components should be replaced per manufacture recommendations or as defined by the DSB
G. Oxygen exposure must follow procedures on 2.4 *Number of dives and oxygen exposure*
H. Diver carried off-board bailout is not required under conditions where the onboard reserves are adequate to return the diver to the surface while meeting proper ascent rate and stop requirements, and the system is configured to allow access to onboard gas
   I- Mixed mode operations must follow procedures on 2.5 *Mixed teams*
   II- Team bailout is not approved
   III-All dives on overhead environments require off-board bailout
I. Use and reuse of CO_2 scrubber media should be per manufacture recommendations or as defined by the DSB

10.8 Minimum Activity to Maintain Authorization

A. The diver should log a minimum of 12 rebreather dives, with a minimum of 12 h underwater time

I- Rebreather dives must be at least 30 min to count towards the minimum
II- If the diver hold authorization for multiple rebreather models, at least two dives must be performed on each model
III- At least four dives must include scientific tasks

B. Divers must practice at least annually rebreather specific skills
   I- Emphasis must be done in problem recognition and emergency procedures
   II- Newer rebreather divers are recommended to practice rebreather specific skills more often, especially prior to a fieldtrip
C. Failure to meet the minimum activity level may be cause for restriction or revocation of rebreather authorization
D. Divers whose active mixed gas has lapsed due to the lack of activity may be required to
   I- If the lapse is less than 12 months, the diver may request rebreather re-authorization to the DSB in writing, with justification for the re-authorization
      i. The DSB/DSO may decide if a checkout or evaluation dive is required
   II- If the lapse is more than 12 months, the diver must
      i. Demonstrate to the DSO Knowledge of the topics required in 10.3-10.4, as appropriate
      ii. The diver will be required to demonstrate the skills required in in 10.3-10.4, as appropriate
         1. If the DSO is not qualified to evaluate the skills of the diver, the DSB will designate a qualified instructor/diver and specific evaluation protocols
E. Divers with 100 dives or more utilizing rebreathers can fulfill the requirements in A-D in double the time

Section 11. AQUARIUM DIVING

An aquarium is an artificial, confined body of water, which is operated by or under the control of an institution and is used for the purposes of specimen exhibit, education, husbandry, or research.

11.1 The Buddy System in Scientific Aquarium Diving

A. All SCUBA diving activities in the confined environment of an aquarium must be conducted in accordance with the buddy system
   I- In an aquarium the buddy system comprises 2-3 divers, or a diver and a tender (see B)
   II- Both are always in visual contact with one another
   III-Can always communicate with one another
   IV-Can always render prompt and effective assistance either in response to an emergency or to prevent an emergency
B. Diver and tender comprise a buddy team in the confined environment of an aquarium only when all the following apply
   I- The maximum depth does not exceed 30 feet
   II- There are no overhead obstructions or entanglement hazards for the diver
   III-The tender is equipped, ready and able to always conduct or direct a prompt and effective in-water retrieval of the diver

11.2 Diving Equipment

A. In an aquarium of a known maximum obtainable depth
   I- Minimum equipment as defined on 3.1 *Minimun equipment* A.1
      i. A depth indicator is not required
         1. Except for a diver conducting repetitive dives
         2. The maximum obtainable depth of the aquarium must be used as the diving depth
      ii. Snorkel is not required
B. Surface-supplied diving equipment is described in Section 12.5

11.3 Requirements for authorization

A. Scientific diving authorization
   I- Except for dives that are conducted within a university course
B. Divers must be familiar with the equipment used (e.g., tender and RGS)
C. Divers must be trained in diving equipment decontamination protocols
   I- Divers must be briefed on particular protocols established at a specific aquarium prior to diving operations
D. Approval by the DSO
E. Fulfilling the requirements specified by the DSO of a specific aquarium

Section 12. SURFACE SUPPLIED DIVING TECHNONOLGIES

Surface supplied diving technologies include any diving mode in which a diver at depth is supplied with breathing gas from the surface.

12.1 Definitions

Surface supply

A mode of diving using open circuit, surface supplied, compressed gas delivered by means of a pressurized umbilical hose. The umbilical generally consists of a gas supply hose, strength member, pneumofathometer hose, and communication line. The umbilical supplies a helmet or full-face mask, often with voice communications.

Hookah Definition

Hookah is an open circuit diving mode comprised of a remote gas supply, a long hose, and a standard scuba second stage or full-face mask. Hookah is generally used in shallow water (30 feet or less), though the configuration has been used to supply breathing gas from a diving bell, habitat, or submersible/submarine.

12.2 Prerequisites

A. Scientific Diver or Scientific Diver-in-Training authorization
B. Complete system specific training as authorized by Texas A&M University - San Antonio

12.3 Procedures

Surface supply

A. Each diver must be continuously tended while in the water
B. A diver must be stationed at the underwater point of entry when diving is conducted in enclosed or physically confined spaces
C. Each diving operation must have a primary breathing gas supply sufficient to support divers for the duration of the planned dive including decompression
D. For dives deeper than 100 feet (30 m) or outside the no-decompression limits
    I- A separate dive team member must tend each diver in the water
    II- A standby diver must be available while a diver is in the water

E. A diver using Surface Supply may rely on surface personnel to keep the diver's depth, time, and diving profile
F. Surface supplied air diving must not be conducted at depths deeper than 190 feet (57.9 m)
G. In aquariums
    I- Where the maximum depth is known, a pneumofathometer is not required
    II- The maximum obtainable depth of the aquarium may be used as the diving depth
    III- One tender may line-tend multiple divers, provided that
        i. The tender is monitoring only one air source
        ii. There is mutual assistance between divers
            1. There are no overhead obstructions or entanglements, or other restrictions
H. The DSB may establish additional protocols as needed, based on case-by-case evaluation of the dive plan

Hookah

A. Hookah diving must not be conducted beyond depths or distance from alternate breathing gas source as determined by the DSB
B. A diver's independent reserve breathing gas supply, if worn, must contain sufficient volume to allow the diver(s) to exit to the surface or alternate breathing gas source
C. Hookah divers not supported by diving bell, or underwater habitat must not be exposed to dives that require staged decompression
D. Divers and tenders must know and use line pull signals for communications if electronic communications are not included in the equipment
E. Dives are limited to a depth of 30 feet with air
    I- Depth limit is 40 feet if using Nitrox with a fO_2 in the range of 32-40
F. In Aquariums
    I- Where the maximum depth is known and planned for, a depth gauge is not required
    II- The maximum obtainable depth of the aquarium may be used as the maximum diving depth.

III-A hookah configured diver may operate without an in-water buddy in an aquarium provided that

i. The diver is tended from the surface
ii. Has visual, line pull, or voice communication with the tender
iii. The diver carries an independent reserve breathing gas source containing sufficient volume to allow the diver to exit to the surface or alternate breathing gas source

G. The DSB may establish additional protocols as needed, based on case-by-case evaluation of the dive plan

12.4 Staffing Requirements

Surface supply

A. The minimum number of personnel comprising a surface supplied dive team is three
   I- Designated Person-In-Charge (DPIC), a Diver, and a Tender
B. Additional dive team members are required when a diving operation or dive site is considered complex, or when the task loading of a dive team member is deemed excessive.
C. The DSB may establish additional protocols as needed, based on case-by-case evaluation of the dive plan

12.5 Equipment

In general

A. Air supplied to the diver must meet the air quality standards outlined in Section 3.6
B. May or may not include voice communication with the surface tender

Surface supply

C. The diver will wear a positive buckling device on the safety harness to which the umbilical hose will be secured
   I- The attachment must be of sufficient strength to prevent any strain on the helmet/full face mask hose connections and equipment must be configured to

allow retrieval of the diver by the surface tender without risk of interrupting air supply to the diver

D. Each diver must be equipped with a diver-carried independent RGS containing sufficient volume to complete the ascent to the surface, including all required decompression and safety stops
E. Masks and Helmets must have
    I- A non-return valve at the attachment points between the mask/helmet and hose which must close readily and positively
    II- An exhaust valve
    III- A minimum ventilation rate capability of 4.5 actual cubic feet per minute (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 atmospheres absolute (ATA) when the diver is producing carbon dioxide at the rate of 1.6 standard liters per minute
    IV- If connected directly to the dry suit or other buoyancy-changing equipment must be equipped with an exhaust valve

Hookah

A. The air supply hose must be rated for a minimum operating pressure of 130psi
B. Hookah supply systems must be capable of supplying all divers breathing from the system with sufficient gas for comfortable breathing for the planned depth and workload
C. Hookah system second stage should be capable of being attached to the diver in a way to avoid pulling stress on the second stage mouthpiece and affords easy release if the diver must jettison the regulator and hose
D. An RGS is recommended in all dives, and must be carried by each hookah diver if
    I- The diver does not have direct access to the surface or
    II- The DSB or DSO requires it based on case-by-case evaluation of the dive plan considering the planned depths, distance from alternate breathing gas sources, and complexity of the task

Section 13. OTHER SPECIALIZED ENVIRONMENTS AND DIVING TECHNOLOGIES

Certain types of diving, some of which are listed below, require equipment or procedures that require further training. This section describes the minimum standards for other specialized environments and diving technologies, but specific requirements will be discussed in a case-by-case basis with the DSO and DSB

13.1 Night Diving

A. Evidence of experience or certification from an internationally recognized training agency on
   I- Night, wreck, or cave diving
   II- Advance diving, including at least one dive under the supervision of a qualified Instructor
B. Demonstrate the appropriate knowledge to the DSO
C. Minimum equipment for night dives
   I- Equipment mentioned on section 3.1 *Minimum equipment* A.I-II
   II- Primary and secondary dive lights
   III- Secondary dive light
   IV- Personal marker lights, which can be chemical or electronical
   V- Dive compass
D. When needed, the dive flag (see 3.3 *Dive flag*) must be illuminated

13.2 Low Visibility Diving

Low visibility dives are defined as conditions in which visual contact with the dive buddy cannot be maintained

A. All divers must be familiar with the problems and hazards associated with diving in low visibility or black water
B. A dive team operating in low visibility/black water must consist of at least one individual experienced (as determined by the DSO) in such low-visibility environments
   I- Two divers inexperienced in low visibility/black water diving should not be paired in any circumstance

i. Except during training dives that are supervised by an instructor

II- Some form of direct physical contact between divers should be maintained

i. Divers must be familiar with the touch-contact signals “emergency”, “stop”, “go”, “back up”, and “line entanglement”

C. If the traditional buddy system is deemed too hazardous to the divers or impractical for the operation

I- A diver may dive as a line tended single diver, ideally with voice communications to the surface tender

II- Line communication between the diver and tender may be acceptable in limited circumstances, as approved by the DSO

III- In this case the practical provisions of surface supplied diving must be used

D. The use of snorkel is optional

13.3 Altitude Diving

Diving in altitudes higher than 300 meters/1000 feet above sea level requires special considerations and procedures

A. All divers must be familiar with the problems and hazards associated with altitude diving
B. Each diver must use a dive computer capable of adjusting for altitude
C. Dive plans must include travel plans considering decompression considerations related with altitude diving

13.4 Blue Water Diving

Blue water diving is defined as diving in open water where the bottom is generally greater than 200 feet deep. It requires special training and the use of multiple-tethered diving techniques. Specific guidelines that should be followed are outlined in “Blue Water Diving Guidelines” (California Sea Grant Publ. No. T-057 2005).

13.5 Ice and Polar Diving

Divers planning to dive under ice or in polar conditions should use the most current NSF Division of Polar Programs, Standards for Conduct of Scientific Diving as outlined in the NSF Office of Polar Programs Safety and Occupational Health Policy

13.6 Dry Suit

A. All divers must demonstrate to the DSO to be familiar with the dry suit operation, and associated problems and hazards, including but not limited to, over inflation leading to uncontrolled ascent, and other buoyancy control and management issues
   I- Certification by an internationally recognized agency in diving with a dry suit, or in courses where a dry suit is a pre-requisite for enrollment for thermal reasons (e.g., technical diving), also meets this requirement
B. A BCD must be worn with all dry suits unless specifically exempted by the DSO
C. Personal flotation devices must not cover the dry suit valves

13.7 Full-Face Mask

A full-face mask is a type of scuba diving where that seals around the perimeter of the entirety of a diver's face, which includes the nose, eyes, and mouth, and contains a mouthpiece or demand valve to provide breathing gas to the diver

A. Each diver wearing a full-face mask must have at least one second stage available and a back-up standard mask for emergency situations
B. Each diver wearing a full-face mask must have been trained in proper use of the mask
C. Prior to conducting full face mask dives outside training divers must demonstrate to the DSO satisfaction skills, knowledge, and attitude appropriate for training in the safe use of full-face masks
   I- Certification as a full-face mask diver by an internationally recognized agency meet this requirement

13.8 Diver Propulsion Vehicle

Diver propulsion vehicles (DPV), also known as underwater scooters, are specialized equipment allowing the diver to increase the distance covered by a diver

A. All divers must demonstrate to the DSO to be familiar with the DPV operation, and associated problems and hazards, including but not limited to
   I- DPV operation
   II- Basic diving skills while on the trigger (e.g., pressure monitoring)
   III- Towing a diver / a second DPV

IV- Managing a runaway DPV
V- Hazards
VI- Emergency scenarios

B. Divers seeking to use DPVs on overhead environments must demonstrate mastery to the DSO on the knowledge and skills, including but not limited to
   I- Topics on A, with details specific to overhead environments
   II- Dive planning
   III- Gas planning
   IV- Underwater navigation
   V- Line work
   VI- Planning for DVP failure
   VII- Air sharing with scooter
   VIII- Zero visibility protocols
C. Certification by an internationally recognized agency in diving with a DPV or DPV on overhead environments fulfill requirements on A and B
D. Low speed DPVs (≤3 m/s or 9.8 ft/s) does not require in-water training, but all divers must be familiar with the operation, and at least one diver of the team must have previous experience with the specific model to be used

13.9 Saturation Diving

Saturation diving is a specialized program that must be considered on a case-by-case basis. Generally, saturation diving is not authorized under the auspices of the A&M-SA Dive Program without special authorization of the DSB

Section 14. OSHA Standards

PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS
Sub-part T—Commercial Diving Operations

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Appendix A

Appendix A to 1910 Subpart T

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Appendix B to 1910 Subpart T

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 will 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 will 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 - 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 air diving - A diving mode in which the diver in the water is supplied from the dive location with compressed air 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 will have the experience or training necessary to perform assigned tasks in a safe and healthful manner.

(2) Each dive team member will have experience or training in the following:

(i) The use of tools, equipment, and systems relevant to assigned tasks;

(ii) Techniques of the assigned diving mode: and

(iii) Diving operations and emergency procedures.

(3) All dive team members will 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 will be trained in diving-related physics and physiology.

(b) Assignments

(1) Each dive team member will be assigned tasks 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 will not require a dive team member to be exposed to hyperbaric conditions against the employee's will, except when necessary to complete decompression or treatment procedures.

(3) The employer will 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 will 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 will have experience and training in the conduct of the assigned diving operation.

1910.420 Safe Practices Manual

(a) General. The employer will develop and maintain a safe practices manual that will be made available at the dive location to each dive team member.

(b) Contents.

(1) The safe practices manual will 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 will 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 will comply with the following requirements prior to each diving operation, unless otherwise specified.

(b) Emergency aid. A list will 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 will be available at the dive location.

(2) When used in a decompression chamber or bell, the first aid kit will 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 will be available at the dive location.

(d) Planning and assessment. Planning of a diving operation will 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 will be coordinated with other activities in the vicinity that are likely to interfere with the diving operation.

(f) Employee briefing
(1) Dive team members will 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 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.

(g) Equipment inspection. The breathing gas supply system including reserve breathing gas supplies, masks, helmets, thermal protection, and bell handling mechanism (when appropriate) will 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 will be displayed at the dive location in a manner that allows all-round visibility, and will 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 will 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 will be provided for entering and exiting the water.

(2) The means provided for exiting the water will extend below the water surface.

(3) A means will be provided to assist an injured diver from the water or into a bell.

(c) Communications

(1) An operational two-way voice communication system will 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 will be available at the dive location to obtain emergency assistance.

(d) Decompression tables. Decompression, repetitive, and no-decompression tables (as appropriate) will be at the dive location.

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

(f) Hand-held power tools and equipment

(1) Hand-held electrical tools and equipment will be de-energized before being placed into or retrieved from the water.

(2) Hand-held power tools will 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 will 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 will be grounded.

(3) Welding and burning cables, electrode holders, and connections will be capable of carrying the maximum current required by the work, and will be properly insulated.

(4) Insulated gloves will 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 will be vented, flooded, or purged with a mixture of gases which will not support combustion.

(h) Explosives

(1) Employers will 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 will not be tested until the diver is out of the water.

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

(i) Termination of dive. The working interval of a dive will 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 will 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 will:

(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 will 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) will 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 will be available at the dive location for dives deeper than 300 fsw.

(3) The decompression chamber will be:

(i) Dual-lock;

(ii) Multiplace; and

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

(4) The decompression chamber will 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 will be available at the dive location.

(6) A dive team member will 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 will 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 will 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 will 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 will:

(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 will comply with the following requirements, unless otherwise specified.

(b) Limits. SCUBA diving will 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 will be available while a diver is in the water.

(2) A diver will 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 will 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 will 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 will be in the closed position prior to the dive.

1910.425 Surface-supplied Air Diving

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

(b) Limits

(1) Surface-supplied air diving will 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 will be ready for use at the dive location for any dive outside the no-decompression limits or deeper than 100 fsw.

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

(c) Procedures

(1) Each diver will be continuously tended while in the water.

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

(3) Each diving operation will 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 will tend each diver in the water:

(ii) A standby diver will be available while a diver is in the water:

(iii) A diver-carried reserve breathing gas supply will be provided for each diver except when heavy gear is worn; and

(iv) A dive-location reserve breathing gas supply will 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 will be available to the standby diver.

(ii) An in-water stage will 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 will 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 will comply with the following requirements, unless otherwise specified.

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

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

(i) A bell is used at depths greater than 220 fsw or when the dive involves in-water decompression time of greater than 120 minutes, except when heavy gear is worn or when diving in physically confining spaces; or

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

(c) Procedures

(1) A separate dive team member will tend each diver in the water.

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

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

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

(5) Each diving operation will 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 will be available to the standby diver; and

(ii) An in-water stage will be provided to divers in the water.

(7) An in-water stage will 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 will 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 will 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 will comply with the following requirements.

(b) Limits. Diving operations involving Live-boating will not be conducted:

(1) With an in-water decompression time of greater than 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 greater than 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 will be stopped before the diver enters or exits the water.

(2) A device will 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 will be available while the diver is in the water.

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

(5) A diver-carried reserve breathing gas supply will be carried by each diver engaged in Live-boating operations.

1910.430 Equipment

(a) General.

(1) All employers will comply with the following requirements, unless otherwise specified.

(2) Each equipment modification, repair, test, calibration or maintenance service will 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 will 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 will be located away from areas containing exhaust or other contaminants.

(3) Respirable air supplied to a diver will not contain:

(i) A level of carbon monoxide (CO) greater than 20 p/m;

(ii) A level of carbon dioxide (CO (2)) greater than 1,000 ppm;

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

(iv) A noxious or pronounced odor.

(4) The output of air compressor systems will 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 will:

(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 4 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 will:

(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 will:

(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 will be equipped with an exhaust valve.

(2) A dry suit or other buoyancy-changing equipment not directly connected to the helmet or mask will be equipped with an exhaust valve.

(3) When used for SCUBA diving, a buoyancy compensator will 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 will be used for SCUBA diving.

(e) Compressed gas cylinders. Compressed gas cylinders will:

(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 or manifolded, or when used for SCUBA diving.

(f) Decompression chambers

(1) Each decompression chamber manufactured after the effective date of this standard, will 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 will be maintained in conformity with the code requirements to which it was built, or equivalent.

(3) Each decompression chamber will be equipped with:

(i) Means to maintain the atmosphere below a level of 25 percent oxygen by volume:

(ii) Mufflers on intake and exhaust lines, which will be regularly inspected and maintained;

(iii) Suction guards on exhaust line openings; and

(iv) A means for extinguishing fire, and will 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 will be used for all dives except SCUBA.

(2) Each depth gauge will be deadweight tested or calibrated against a master reference gauge every 6 months, and when there is a discrepancy greater than two percent (2 percent) of full scale between any two equivalent gauges.

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

(4) A timekeeping device will be available at each dive location.

(h) Masks and helmets

(1) Surface-supplied air and mixed-gas masks and helmets will have:

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

(ii) An exhaust valve.

(2) Surface-supplied air masks and helmets will 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 over forty percent (40%) by volume oxygen will be designed for oxygen service.

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

(3) Oxygen systems over 125 psig and compressed air systems over 500 psig will have slow-opening shut-off valves.

(j) Weights and harnesses

(1) Except when heavy gear is worn, divers will 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 will 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 will 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 will make available for inspection and copying any record or document required by this standard.

(2)Records and documents required by this standard will 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) 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 (1910.430) will also be provided upon request to employees and their designated representatives.

(3)Records and documents required by this standard will 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 will forward such records to the National Institute for Occupational Safety and Health, Department of Health and Human Services. The employer will 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 will 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 will 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 will 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 will 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 for 5 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 will 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, will use scientific expertise in studying the underwater environment and, therefore, are scientists or scientists in training.

[50 FR 1050, Jan. 9, 1985]

GLOSSARY

AAUS – The American Academy of Underwater Sciences.

Active Scientific Diver - An individual who is authorized to be a Scientific Diver operating under university auspices in accordance with 4.4 and 4.6

A&M-SA – Texas A&M University – San Antonio

Air sharing - Sharing of an air supply between divers.

ATA(s) - "Atmospheres Absolute", Total pressure exerted on an object, by a gas or mixture of gases, at a specific depth or elevation, including normal atmospheric pressure.

Alternate Gas Supply - Fully redundant system capable of providing a gas source to the diver should their primary gas supply fail.

Authorization-The DSB authorizes divers to dive using specialized modes of diving, and the depth they may dive to.

Breath-hold Diving - A diving mode in which the diver uses no self-contained or surface-supplied air or oxygen supply.

Bottom dive time – Dive team from the start of the dive until the start of a continuous ascent until reaching the surface, safety stop, or decompression stop

Bubble Check - Visual examination by the dive team of their diving systems, looking for O-ring leaks or other air leaks conducted in the water prior to entering a cave. Usually included in the "S" Drill.

Buddy Breathing - Sharing of a single air source between divers.

Buddy System - Two comparably equipped SCUBA divers in the water in constant communication.

Buoyant Ascent - An ascent made using some form of positive buoyancy.

Buoyancy Control Device (BCD) – Specialized diving equipment that allows the buoyancy control of a diver and secure the SCUBA cylinder(s)

Cave Dive - A dive, which takes place partially or wholly underground, in which one or more of the environmental parameters defining a cavern dive are exceeded.

Cavern Dive - A dive which takes place partially or wholly underground, in which natural sunlight is continuously visible from the entrance.

CC – Close Circuit. In reference to diving rebreathers.

Certified Diver - A diver who holds a recognized valid certification from an AAUS OM or internationally recognized certifying agency.

(Scientific Diver) Certification- A diver who holds a recognized valid certification from an AAUS OM

Controlled Ascent - Any one of several kinds of ascents including normal, swimming, and air sharing ascents where the diver(s) maintain control so a pause or stop can be made during the ascent.

Cylinder - A pressure vessel for the storage of gases.

Decompression Sickness - A condition with a variety of symptoms, which may result from gas, and bubbles in the tissues of divers after pressure reduction.

Designated Person-In-Charge - Supervision requirement for Surface Supplied diving mode. An individual designated by the OM DSB or designee with the experience or training necessary to direct and oversee surface supplied diving operations.

Dive - A descent into the water, an underwater diving activity utilizing compressed gas, an ascent, and return to the surface.

Dive Computer - A microprocessor-based device which 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 Location - A surface or vessel from which a diving operation is conducted.

Dive Site - Physical location of a diver during a dive.

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.

Dive Professional - A diver who holds a recognized valid certification to instruct, or assist an instructor, diving techniques from internationally recognized certifying agency.

Dive Propulsion Vehicle (DPV) – Underwater propulsion equipment allowing divers to extend the distance covered during a dive

Diver – A person who stays underwater for long periods by having compressed gas supplied from the surface or by carrying a supply of compressed gas.

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.

Diving Mode - A type of diving required specific equipment, procedures, and techniques, for example, snorkel, SCUBA, surface-supplied air, or mixed gas.

Dive Safety Board (DSB) - Group of individuals who act as the official representative of the membership organization in matters concerning the scientific diving program (See Dive Safety Board under Section 1.0).

Diving Safety Officer (DSO) - Individual responsible for the safe conduct of the scientific diving program of the membership organization (See Diving Safety Officer under Section 1.0).

DPIC – See Designated Person-In-Charge.

EAD - Equivalent Air Depth (see below).

Emergency Swimming Ascent - An ascent made under emergency conditions where the diver may exceed the normal ascent rate.

Enriched Air (EANx) - A name for a breathing mixture of air and oxygen when the percent of oxygen exceeds 21%. This term is considered synonymous with the term "nitrox" (Section 6.00).

Equivalent Air Depth (EAD) - Depth at which air will have the same nitrogen partial pressure as the nitrox mixture being used. This number, expressed in units of feet seawater or saltwater, will always be less than the actual depth for any enriched air mixture.

Flooded Mine Diving - Diving in the flooded portions of a man-made mine. Necessitates use of techniques detailed for cave diving.

fO2 - Fraction of oxygen in a gas mixture, expressed as either a decimal or percentage, by volume.

FSW - Feet of seawater.

Gas Management - Gas planning rule which is used in cave diving environments in which the diver reserves a portion of their available breathing gas for anticipated emergencies (See Rule of Thirds, Sixths).

Gas Matching – The technique of calculating breathing gas reserves and turn pressures for divers using different volume cylinders. Divers outfitted with the same volume cylinders may employ the Rule of Thirds for gas management purposes. Divers outfitted with different volume cylinders will not observe the same gauge readings when their cylinders contain the same gas volume, therefore the Rule of Thirds will not guarantee adequate reserve if both divers must breathe from a single gas volume at a Rule of Thirds turn pressure. Gas Matching is based on individual consumption rates in volume consumed per minute. It allows divers to calculate turn pressures based on combined consumption rates and to convert the required reserve to a gauge based turn pressure specific to each diver's cylinder configuration.

Guideline - Continuous line used as a navigational reference during a dive leading from the team position to a point where a direct vertical ascent may be made to the surface.

Hookah - While similar to Surface Supplied in that the breathing gas is supplied from the surface by means of a pressurized hose, the supply hose does not require a strength member, pneumofathometer hose, or communication line. Hookah equipment may be as simple as a long hose attached to a standard SCUBA cylinder supplying a standard SCUBA second stage. The diver is responsible for monitoring their own depth, time, and diving profile.

Hyperbaric Chamber - See Recompression chamber.

Hyperbaric Conditions - Pressure conditions in excess of normal atmospheric pressure at the dive location.

Independent Reserve Breathing Gas - 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.

Jump/Gap Reel - Spool or reel used to connect one guide-line to another thus ensuring a continuous line to the exit.

Life Support Equipment – Underwater equipment necessary to sustain life.

Lead Diver - Certified scientific diver with experience and training to conduct the diving operation.

Letter of Reciprocity (LOR) – Document stating that a scientific diver has an active status, along with his diving experience to allow him to participate in scientific diving activities by a host institution with a scientific diving program. Expedition of a LOR does not assume liability by either the visiting or host program, and this must be defined prior to the start of diving activities.

Organizational Member (OM) - An organization which 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 Manual.

Manifold with Isolator Valve - A manifold joining two diving cylinders, that allows the use of two completely independent regulators. If either regulator fails, it may be shut off, allowing the remaining regulator access to the gas in both of the diving cylinders.

Mixed Gas - Breathing gas containing proportions of inert gas other than nitrogen greater than 1% by volume.

Mixed Gas Diving - A diving mode in which the diver is supplied in the water with a breathing gas other than air.

MOD - Maximum Operating Depth, usually determined as the depth at which the pO2 for a given gas mixture reaches a predetermined maximum.

Nitrox - Any gas mixture comprised predominately of nitrogen and oxygen, most frequently containing between 22% and 40% oxygen. Also be referred to as Enriched Air Nitrox, abbreviated EAN.

Normal Ascent - An ascent made with an adequate air supply at a rate of 30 feet per minute or less.

OC – Open Circuit

OTU - Oxygen Toxicity Unit

Oxygen Compatible - A gas delivery system that has components (O-rings, valve seats, diaphragms, etc.) that are 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.

Penetration Distance - Linear distance from the entrance intended or reached by a dive team during a dive at a dive site.

Pressure-Related Injury - An injury resulting from pressure disequilibrium 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.

ppO2 - Inspired partial pressure of oxygen, usually expressed in units of atmospheres absolute.

Primary Reel - Initial guideline used by the dive team from open water to maximum penetration or a permanently installed guideline.

PSI - Unit of pressure, “pounds per square inch.

PSIG - Unit of pressure, “pounds per square inch gauge.

Recompression Chamber - A pressure vessel for human occupancy. Also called a hyperbaric chamber or decompression chamber.

Restriction - Any passage through which two divers cannot easily pass side by side while sharing air.

Rule of Thirds - Gas planning rule which is used in cave diving environments in which the diver reserves 2/3's of their breathing gas supply for exiting the cave or cavern.

Rule of Sixths - Air planning rule which is used in cave or other confined diving environments in which the diver reserves 5/6's of their breathing gas supply (for DPV use, siphon diving, etc.) for exiting the cave or cavern.

Safety Drill - ("S" Drill) - Short gas sharing, equipment evaluation, dive plan, and communication exercise carried out prior to entering a cave or cavern dive by the dive team.

Safety Reel - Secondary reel used as a backup to the primary reel, usually containing 150 feet of guideline that is used in an emergency.

Safety Stop – A stop made between 15-20 feet (5-6 meters) for 3-5 minutes during the final ascent phase of a dive.

Scientific Diving - Scientific diving is defined (29CFR1910.402) as 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.

SCUBA Diving - A diving mode independent of surface supply in which the diver uses open circuit self-contained underwater breathing apparatus.

Side Mount - A diving mode utilizing two independent SCUBA systems carried along the sides of the diver's body; either of which always has sufficient air to allow the diver to reach the surface unassisted.

Siphon - Cave into which water flows with a generally continuous in-current.

Standby Diver - A diver at the dive location capable of rendering assistance to a diver in the water. Must be ready to render diving aid in no more than 60 seconds.

Surface Supplied Diving - Surface Supplied: Dives where the breathing gas is supplied from the surface by means of a pressurized umbilical hose. The umbilical generally consists of a gas supply hose, strength member, pneumofathometer hose, and communication line. The umbilical supplies a helmet or full-face mask. The diver may rely on the tender at the surface to keep up with the divers' depth, time and diving profile.

Swimming Ascent - An ascent, which can be done under normal or emergency conditions accomplished by simply swimming to the surface.

Task loaded dive – Dives with more tasks than those expected during a normal dive. Examples includes, scientific dives, working dives, instructional dives. In the case of instructional dives, it is considered a task loaded dive for the instructor and assistant instructor, but not for the trainees during courses seeking a recreational diving certification.

Tender - Used in Surface supplied and tethered diving. The tender comprises the topsides buddy for the in-water diver on the other end of the tether. The tender must have the experience or training to perform the assigned tasks in a safe and healthful manner.

Total dive time – Total time from the start to the end of the dive. Also referred to as surface to surface time.

Turn Pressure – The gauge reading of a diver's open circuit SCUBA system designating the gas limit for terminating the dive and beginning the exit from the water.

Umbilical - Composite hose bundle between a dive location and a diver or bell, or between a diver and a bell, which supplies a 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.

Verification of Training (VOT) - Document stating that a scientific diver received scientific diving training following or exceeding the minimum standards set by AAUS, along with diving experience of the diver. Information on a VOT will only contain information of the diving activities while under the university's auspices, it does not imply that the diver is in active scientific diving status or liability for the diver.

LIST OF APPENDIXES

TEXAS A&M UNIVERSITY-SAN ANTONIO

Dive Program

Appendix 1: Diving Program Application

The purpose of this form is to apply for the university dive program, or formally change the depth certification or experience of a university diver.

Date Submitted: / /

1.- Diver Information

Diver Name: **Phone:** **email:**

Address:

City: **State:** **Zip Code:**

Birthdate:

Relationship with A&M-SA: Faculty __ Staff __ Student __ Visitor __ Other:

Diving Accident Insurance: **Insurance Number:** **Expiration:**

2.- Emergency contact information:

Name: **Phone:** **email:**

Address:

City: **State:** **Zip Code:**

3.- Current Classification at A&M-SA:

Scientific diver __ Scientific Diver-In-Training __ Temporary Scientific Diver __

Recreational Diver __ Divemaster __ Diver Instructor __ Scientific Diver Instructor __

Depth Certification: _____ **Scientific Dive Depth Rating:** _____

4.- Sought Classification at A&M-SA:

Scientific diver __ Scientific Diver-In-Training __ Temporary Scientific Diver __

Recreational Diver __ Instructor Assistant/Divemaster __

Scientific Dive Depth Rating: _____

5.- Diving Certifications & Certificates

Diving Certifications:
List Highest to lowest.

Certification Level	Agency	Certification Date

Other Relevant Certifications
First Aid, CPR, O2 administration certifications without an expiration date are valid for two years.

Certification Level	Agency	Certification Date	Expiration date
First Aid			
CPR			
O_2 Administration			
AED			

6.- Diver Experience

Years of diving: **Total number of dives:** **Total number of hours underwater:**

Greatest Depth: **Number of dives in the last 12 months:**

Number of Scientific dives in the last 12 months:

Detailed experience:

	0-30'	31-60'	61-100'	101-130'	>130'
Number of dives					
Time at depth					

Dive locations where experience has been gained:

Experience by Dive Platforms: x= Some experience; xx= >50 dives of experience

Shore __ Pier/Dock __ Small Boat __ Ship __ Other(s):

Experience by Environments: x= Some experience; xx= >50 dives of experience

Coastal __ Offshore __ Ocean __ River __ Lake __Aquarium __ Wreck __ Cavern __ Cave __

Tropical Water __ Cold Water __ Altitude __ Night __ Blue water __ Black Water __

Limited visibility __ Navigation __ Strong current __ Other(s):

Experience by Diving Modes and specialized equipment: x= Some experience; xx= >50 dives of experience

OC __ CC __ Hookah __ Doubles __ Side Mount __ Dry Suit __ Full Face Mask __

Nitrox __ Trimix __ Tables __ Computer __Other(s):

Experience by Deco Modes:

No decompression __ Decompression __

Experience by Task: x= Some experience; xx= >50 dives of experience; >100 for Scientific dives

Scientific dives __ Working dives __ Collecting __ Photography __ Search/Recovery __

Installation/removal __ Monitoring __ Instructing __

Additional diving experience:

7.- Approval

DSO or DCB approval

_____ _____

DSO or DSB Date

Remarks, Conditions, Restrictions:

TEXAS A&M UNIVERSITY-SAN ANTONIO

Dive Program

Appendix 1b: Personal equipment registration and maintenance record

A&M-SA divers must register personal diving equipment and get approval from the DSO prior to use in any diving activity. The owner takes full responsibility of such equipment and must maintain it in accordance with the manufacturer.

This basic form can be used as a guideline and be modified or expanded as needed. This form can also be maintained as an electronic database (e.g. , excel worksheet)

Date Submitted: / /

Diver Name:

Equipment owned	Brand & model	Serial Number	Service date		Expires	
Regulator						
First Stage						
Primary 2nd Stage						
Secondary 2nd Stage						
Pressure Gauge						
BCD						
Dive computer						
Cylinder			VIP	HYDRO	VIP	HYDRO
Rebreather						

Appendix 2: Release of Liability, Waiver of Rights, and Indemnification Agreement

(Initial at the left of each section after you have read it)

1. In consideration for receiving permission to participate in this scuba diving activity, I, **release, waive, covenant not to sue, and agree to hold harmless** The Texas A&M University System, the Board of Regents of The Texas A&M University System, Texas A&M University - San Antonio and their officers, servants, agents, volunteers, or employees (herein referred to as RELEASEES) from any and all liabilities, claims, demands, or injury, including death, that may be sustained by me while participating in such activity, or while on the premises owned or leased by RELEASEES, **including injuries sustained as a result of the negligence of RELEASEES**. I understand that this release and waiver shall not apply to injuries and claims caused as a direct result of gross negligence or willful misconduct on the part of RELEASEES.
2. I am fully aware that there are inherent risks involved with scuba diving, and I still choose to voluntarily participate in said activity with full knowledge that said activity may be hazardous to me and my property. I voluntarily assume full responsibility for any risks of loss, property damage or personal injury, including death, which may be sustained by me as a result of participating in said activity including **injuries sustained as a result of the negligence of RELEASEES**. I further agree to indemnify and hold harmless the RELEASEES for any loss, liability, damage or costs, including court costs and attorney's fees that may occur as a result of my participation in said activity.
3. My signature below means I agree to abide by the policies, provisions, and standards, which govern training and diving operations in the university diving program as set forth in the **Texas A&M University - San Antonio Diving Standards for Underwater Operations**. I further agree to familiarize myself with the aforementioned manual.
4. 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.
5. It is my express intent that this **Release of Liability, Waiver of Rights, And Indemnification 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.
6. By signing this document, I acknowledge and represent that I have read it and understand it and sign it voluntarily as my own free act and deed; no oral representations, statements, or inducements apart this agreement have been made. I

sign this document for full, adequate and complete consideration fully intending to be bound by the same, now and in the future.

Participant Signature	Date
Printed Name	Date of Birth

If participant is under 18 years old,

Parent or Legal Guardian Signature	Date

Parent or Legal Guardian Signature Printed Name

Appendix 3: Diving Medical Exam Overview for The Examining Physician

To the examining physician:

This person, _____, requires a medical examination to assess their fitness for certification as a Scientific Diver for **Texas A&M University - San Antonio**. Their answers on the Diving Medical History Form (attached – **Appendix 4**) may indicate potential health or safety risks as noted. Your evaluation is requested on the attached SCUBA Diving Fitness Medical Evaluation Report. If you have questions 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 an attached list, the Undersea Hyperbaric and Medical Society, or the Divers Alert Network. Please contact the undersigned Diving Safety Officer if you have any questions or concerns about diving medicine or the diving standards at Texas A&M University - San Antonio. Thank you for your assistance.

_____	_____
Diving Safety Officer	Date
_____	_____
Printed Name	Phone Number

SCUBA and other modes of compressed-gas diving can be strenuous and hazardous. A special risk is present if the middle ear, sinuses, or lung segments do not readily equalize air pressure changes. The most common cause of distress is eustachian insufficiency. Recent deaths in the scientific diving community have been attributed to cardiovascular disease. Please consult the following list of conditions that usually restrict candidates from diving. (Adapted from Bove, 1998)

Conditions which may disqualify candidates from diving:

Note: bracketed numbers are pages in Bove,1998

1. Abnormalities of the tympanic membrane, such as perforation, presence of a monomeric membrane, or inability to autoinflate the middle ears. [5, 7, 8, 9]
2. Vertigo, including Meniere's Disease. [13]
3. Stapedectomy or middle ear reconstructive surgery. [11]
4. Recent ocular surgery. [15, 18, 19]
5. Psychiatric disorders including claustrophobia, suicidal ideation, psychosis, anxiety states, untreated depression. [20 - 23]
6. Substance abuse, including alcohol. [24 - 25]
7. Episodic loss of consciousness. [1, 26, 27]

8. History of seizure. [27, 28]
9. History of stroke or a fixed neurological deficit. [29, 30]
10. Recurring neurologic disorders, including transient ischemic attacks. [29, 30]
11. History of intracranial aneurysm, other vascular malformation or intracranial hemorrhage. [31]
12. History of neurological decompression illness with residual deficit. [29, 30]
13. Head injury with sequelae. [26, 27]
14. Hematologic disorders including coagulopathies. [41, 42]
15. Evidence of coronary artery disease or high risk for coronary artery disease. [33 - 35]
16. Atrial septal defects. [39]
17. Significant valvular heart disease - isolated mitral valve prolapse is not disqualifying. [38]
18. Significant cardiac rhythm or conduction abnormalities. [36 - 37]
19. Implanted cardiac pacemakers and cardiac defibrillators (ICD). [39, 40]
20. Inadequate exercise tolerance. [34]
21. Severe hypertension. [35]
22. History of spontaneous or traumatic pneumothorax. [45]
23. Asthma. [42 - 44]
24. Chronic pulmonary disease, including radiographic evidence of pulmonary blebs, bullae, or cysts. [45, 46]
25. Diabetes mellitus. [46 - 47]
26. 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

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TEXAS A&M UNIVERSITY-SAN ANTONIO

Dive Program

Appendix 4: Diving Medical History Form

Name	DOB	Age	Wt.	Ht.

Date of Evaluation (Month/Day/Year)

To The Applicant:

SCUBA diving places considerable physical and mental demands on the diver. Certain medical and physical requirements must be met before beginning a diving or training program. Your accurate answers to the questions are more important, in many instances, in determining your fitness to dive than what the physician may see, hear, or feel as part of the diving medical certification procedure.

This form must be kept confidential by the examining physician. If you believe any question amounts to invasion of your privacy, you may elect to omit an answer, provided that you must subsequently discuss that matter with your own physician who must then indicate, in writing, that you have done so, and that no health hazard exists.

Should your answers indicate a condition which 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 to 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.

	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 stomachs, nervous stomachs or vomiting spells	
12			Had a major operation	
13			Presently being treated by a physician	

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	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, frequent 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	
42			Pneumonia	
43			Tuberculosis	
44			Shortness of breath	
45			Lung problem or abnormality	
46			Spit blood	
47			Are you subject to bronchitis	

	Yes	No	Please indicate whether or not the following apply to you	Comments
48			Breathing difficulty after eating particular foods, after exposure to particular pollens or animals	
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			Low blood pressure	
60			Recurrent or persistent swelling of the legs	
61			Pounding, rapid heartbeat or palpitations	
62			Easily fatigued or short of breath	
63			Abnormal EKG	
64			Joint problems, dislocations or arthritis	
65			Back trouble or back injuries	
66			Ruptured or slipped disk	
67			Limiting physical handicaps	
68			Muscle cramps	
69			Varicose veins	
70			Amputations	
71			Head injury causing unconsciousness	
72			Paralysis	
73			Have you ever had an adverse reaction to medication?	
74			Do you smoke?	
75			Have you ever had any other medical problems not listed? If so, please list or describe below;	
76			Is there a family history of high cholesterol?	
77			Is there a family history of heart disease or stroke?	
78			Is there a family history of diabetes?	
79			Is there a family history of asthma?	
80			Date of last tetanus shot? Vaccination dates?	

Please explain any "yes" answers to the above questions.

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

Signature

Date

Appendix 5: AAUS Medical Evaluation Of Fitness For Scuba Diving Report

Name of Applicant (Print or Type) _____ Date of Evaluation (Month/Day/Year) _____

To The Examining or Supervising Physician: Scientific divers require periodic SCUBA diving medical examinations to assess their fitness to engage in diving with self-contained underwater breathing apparatus (SCUBA). Their answers on the Diving Medical History Form (**Appendix 4**) may indicate potential health or safety risks as noted. SCUBA diving is an activity that puts unusual stress on the individual in several ways. Your evaluation is requested on this Medical Evaluation form. Your opinion on the applicant's medical fitness is requested. SCUBA diving requires heavy exertion. The diver must be free of cardiovascular and respiratory disease (see references, following page). An absolute requirement is the ability of the lungs, middle ears, and sinuses to equalize pressure. Any condition that risks the loss of consciousness should disqualify the applicant. Please proceed in accordance with the American Academy of Underwater Sciences (AAUS) Medical Standards. If you have questions about diving medicine, please consult with the Undersea Hyperbaric Medical Society or Divers Alert Network.

NOTE: Although portions of this exam may be conducted by other medical professionals (P.A. or N.P.), final signature for diving must come from a Medical Doctor (M.D.) or Osteopath (D.O.).

Tests: The following tests are required:

During all initial and periodic re-exams (under age 40):

- Medical history
- Complete physical exam, with emphasis on neurological and otological components
- Urinalysis
- Any further tests deemed necessary by the physician

Additional tests during first exam over age 40 and periodic re-exams (over age 40):

- Chest x-ray (Required only during first exam over age 40)
- Resting EKG
- Assessment of coronary artery disease using Multiple-Risk-Factor Assessment[1]
- (age, lipid profile, blood pressure, diabetic screening, smoking)

Note: Exercise stress testing may be indicated based on Multiple-Risk-Factor Assessment[1]

Physician's statement:

I have evaluated the above mentioned individual according to the tests listed above. 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.

___ 01 I find no medical conditions that may be disqualifying for participation in SCUBA diving.
Diver **IS** medically qualified to dive for: _____2 years (over age 60)
_____3 years (age 40-59)
_____5 years (under age 40)

___ 02 Diver **IS NOT** medically qualified to dive: _____Permanently _____Temporarily.

_____ MD or DO _____
Signature Date

_____
Name (Print or Type)

_____
Address

_____ _____
Telephone Number E-Mail Address

My familiarity with applicant is: ___This exam only ___Regular physician for ___years

My familiarity with diving medicine is: _____

References

[1]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

Appendix 5b: AAUS Medical Evaluation of Fitness for Scuba Diving Report
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 the Texas A&M University - San Antonio Diving Safety Officer and Diving Safety Board or their designee at (place) _____ on (date) _____

_____ _____
Signature of Applicant (Print or Type) Date

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Dive Program

Appendix 6: Dive Plan Proposal

Date Submitted: / /

1.- Basic Information

Department:

Project supervisor: **Phone:** **email:**

Lead Diver: **Phone:** **email:**

Project Title:

2.- Dive team members

It is the responsibility of the PI and Lead Diver to ensure that all divers have experience and current authorizations for the proposed activities.

Name of diver	Applicable certification(s)	Affiliation	Depth rating[1]	DAN # & expiration	Diver cellphone	Personal equipment

3.- Diving activities

Classification of Diving Activities: Scientific __ Working __ Training __

Proficiency __ Recreational __

Divers' affiliation: A&M-SA __ Reciprocity divers __

Guest Scientific diver __ External Diver Volunteer(s)[2] __

Proposed date(s):

Dive Site location(s):

Country/State	County	Site Name[3]	GPS coordinates[4]

Approximate number of dives: __ # Divers x __ # Dives per diver = __ Total dives

4.- Dive Plan

Dive Platform(s): Shore __ Pier/Dock __ Small Boat __ Ship __ Other(s):

Environment(s): Inland Waters __ Coastal __ Offshore __ Pool __ Aquarium __ Wreck __

Cave __ Cold Water __ Altitude __ Night __ Blue water __ Black Water __

Other(s):

Expected visibility: > 30 ft (10 m) __ >10ft (3 m) __ <10ft (3 m) __

Diving Mode(s): OC __ CC __ Hookah __ Other(s):

Deco Mode(s): No decompression __ Decompression __

Breathing gas(es): Air __ Nitrox __ Trimix __ Other(s):

Deco gas(es): N/A __ Nitrox __ O_2 __ Other(s):

Source(s) of Breathing gas: **Current air test:**

Dive Planner: Table __ Dive computer __ Software __ **Details**[5]**:**

Max depth[6]**:** **Max dives per day:** **Min surface interval(s):**

Proposed dive profile(s)[7]**:**
Include MOD of all gases. All dive plans deeper than 190 feet must be approved by the DCB

Proposed work

Briefly provide details of dive procedures, including dive buddy system and specialized tools/methods required.

Trip itinerary

Date	Time	Activity

5.- Diving Risk Assessment and Mitigation Plans

Certain hazards are present on all dives (AGE, DCS). List hazards unique to this operation (e.g. thermal issues, complex navigation, high currents, deep depths, low visibility, vessel traffic, hazardous marine organisms, etc.) and measurements for eliminating or reducing risk to acceptable levels.

Risk	Mitigation Measures

NOAA GAR Model Score for Risk Assessment[8]: **GAR Model Color[8]:**

Mitigation measures[8]:

4.- Emergency Plan

Emergency equipment at site: First Aid Kit __ Oxygen __ AED __ Satellite communicator __ Other(s)

In water emergency and diver recall procedures

Primary Emergency Contacts

Emergency Medical Services (EMS): **911**
At sea Emergency: **VHF channel 16** (International distress frequency)
DAN Emergency Hotline: **+1-919-684-9111**
DAN – Non emergencies: +1-919-684-2948; +1 (800) 446-2671 (Workdays 8:30-17:00 ET)
Other local Emergency contacts:

Emergency contact information

Nearest Dive Emergency Hyperbaric Chamber
Name:
Address:
Phone:
Hours of operation:
Distance and estimated duration of transportation from furthers site:

Nearest Medical Treatment Facility
Name:
Address:
Phone:
Hours of operation:
Distance and estimated duration of transportation from furthers site:

A&M-SA DSO
Fernando Calderón Gutiérrez
Office: +1 210 784 2292
Cell: +1 409 692 7271(phone calls, text)
Cell 2: +52 612 153 5251 (phone calls, text, WhatsApp)
Email: Fernando.CalderonGutierrez@tamusa.edu

A&M-SA Environmental Health & Safety
Name:
Office: +1 210 784 2822
Email:

Others Emergency contacts:

Anticipated means of Victim Transport:

Other comments on Emergency protocols:

Emergency contacts

Also include all non-diver participants in the fieldtrip. Non-disclose, and disclosure of further medical information options are available[9]

Name	Emergency contact name	Relation	Phone number

7.- Approvals

Lead Diver Affidavit
I agree to follow all A&M-SA diving regulations.

TEXAS A&M UNIVERSITY-SAN ANTONIO

Dive Program

Signature of Lead Diver	Date

Project supervisor

I verify the need for this dive operation and agree with the submitted dive plan.

Signature of Project supervisor	Date

DSO or DCB approval

DSO or DSB	Date

Remarks, Conditions, Restrictions:

A printed copy must be available on-site during field operations

[1]Depth rating corresponding to the classification of diving activities.

[2]Only applicable if they are not paid by the university/project, they are not using university owned diving equipment, and they are not performing scientific activities (only acting as dive buddy/safety diver). **External diver volunteers cannot be affiliated with A&M-SA or an AAUS organization member.** If external diver volunteer(s) will participate, submit appropriate dive certification(s), dive insurance, and liability release form to DSO. You must receive confirmation/approval by the DSO before any dive with external diver volunteers.

[3]If the project includes the exploration of new/unknown sites at the time of submission, add "New site" as Site Name. Submit the site information to the DSO as soon as possible (can be done during field operations are ongoing).

[4]Exact or Approximate GPS coordinates when available. Use Decimal degrees.

[5]Specific table/computer/software used. If applicable, include algorithm and gradient factor or conservative factor.

[6]Indicate units used.

[7]It is only required to include the most restrictive dive profile if all divers are certified/approved for it. Include different dive plans when appropriate (e.g. , different dive teams performing different profiles, dives with different gasses, etc.). Include the initials of divers performing each dive profile if they are not applicable to all divers.

[8]Dives requiring technical diving techniques must include at least one Risk Assessment following the NOAA GAR Model for Operational Risk Management (NOAA Form 57-03-30, page 2). Include the full table as supplemental information. DSO/DCB may require it for dive plans not requiring technical diving but deemed complex operations. Operations with GAR Model color "RED" or scores on one category ≥ 8, or two categories ≥ 7, regardless of total score require approval from the DCB.

[9]Names of all participants must be included in the table. Participants have the option to not disclose their emergency contact information (name, relationship, contact number) in this table. In this case, the participant must inform the Lead Diver, and provide emergency contact information in a close envelope to the Lead Diver, the PI, or another team member. At the participant discretion, the participant can include other relevant medical information in the envelop. The Participant must inform who will have the envelope, and where it will be placed, such information can be added to the table in this dive plan. The envelope must be available at the dive site. The participant agrees that information in the envelope will be available in case of emergency. The participant is responsible for retrieving the envelope at the end of the trip.

Appendix 6b: Emergency Procedures

1.- General Procedures

Immediately Call 911 / VHF 16 /SOS on satellite communicators

The following procedures are minimum guidelines. The following are not in order of preference as each emergency will dictate its own priorities. Depending on and according to the nature of the diving accident:

1. Make appropriate contact with victim or rescue as required
2. Establish (A)irway (B)reathing (C)irculation; or (C)irculation (A)irway (B)reathing as appropriate
3. If needed, administer artificial respiration and CPR supplemented with oxygen until relieved by professional medical personnel
    a. If available, prepare EAD
4. If the patient is breathing, but unconscious, place the victim in the recovery position and administer oxygen using a non-rebreather or demand type mask
5. Stabilize the victim
    a. In case of suspected cervical spinal injury, stabilize victim using accepted treatment procedures
    b. Wait for EMS or transport with as little movement as possible
6. Administer 100% oxygen, if appropriate (in cases of Decompression Illness, or Near Drowning)
7. Call local Emergency Medical System (EMS) for transport to nearest medical treatment facility
    a. Explain the circumstances of the dive incident to the evacuation teams, medics, and physicians. Do not assume that they understand why 100% oxygen may be required for the diving accident victim or that recompression treatment may be necessary
    b. Suggest to health professionals without training in hyperbaric medicine to contact DAN hotline for medical support
    c. Keep the cellphone line available as much as possible for EMS to contact you back
8. Call DAN emergency hotline
    a. Keep the cellphone line available as much as possible for DAN to contact you back
9. Conduct and document a Field Neurological Assessment
10. Conduct secondary assessment
11. Periodically check the conditions of the victim's dive buddy
12. Perform a roll call to account for all divers and non-divers in the field team

13. Call appropriate Diving Accident Coordinator for contact with diving physician and recompression chamber, etc.
14. At the medical facility, do not assume that all health professionals understand why 100% oxygen may be required for the diving accident victim or that recompression treatment may be necessary
    a. Suggest to health professionals without training in hyperbaric medicine to contact DAN hotline for medical support
15. Create a log including the details of the accident, state of the victim(s), response actions conducted
16. Notify the DSO or a DCB member. Speak to a person, do not just leave a message
17. Contact the victim's emergency contact
18. Secure and store the dive equipment **without disassembly it**
    a. Record the pressure in the tank, then close the cylinder valve only
    b. Count and record number required to secure the valve
19. Review this emergency procedures to help making sure all steps are being conducted. It is recommended to mark the steps undertaken
20. After the victim(s) are under care of health professionals
    a. In cases of Decompression Illness, continue monitoring all members of the dive team, especially the dive buddy of the victim for at least 48 hours
        i. Do not let alone the dive buddy of the victim during this time
    b. Complete and submit Incident Report Form Appendix **8** to the DSO

Constantly check in the rest of the dive team members, especially the dive buddy of the victim

Make sure to do a roll call to account for all divers and non-divers in the field team

Assign roles to different individuals, make sure to clearly state who is assigned each role. Depending on the situation and the number of responders, some roles may be

A. Responder 1 - **Call 911 / VHF.** Stay in the line until they terminate the call
    I- Relay the information to the rest of the responders
B. Responder 2 – Emergency response & first aids
C. Responder 3 – Call DAN emergency line. Stay in the line until they terminate the call
    I- Relay the information to the rest of the responders
D. Responder 4
    I- Coordinate the emergency response
    II- Review this emergency procedures to help making sure all steps are being conducted
        i. It is recommended to mark the steps undertaken

III- Gather the diving equipment of the victim(s)
IV- Create a log including the details of the accident, state of the victim(s), response actions conducted. Make available this log to emergency services
V- Contact the DSO
VI- Contact the Emergency contact from the victim(s)

Do not delay contacting emergency services (911) and attending the victim

If the situation presents itself, do not speak with media representatives

Do not share pictures, videos, or information in social media

Primary Emergency Contacts

Emergency Medical Services (EMS): **911**
At sea Emergency: **VHF channel 16** (International distress frequency)
DAN Emergency Hotline: **+1-919-684-9111**
DAN – Non emergencies: +1-919-684-2948; +1 (800) 446-2671 (Workdays 8:30-17:00 ET)

Contacting Emergency Services

In the event of a diving accident, be prepared to answer these questions for emergency services but do not delay contacting emergency services while obtaining the information:

A. Number of victim(s)
B. Is the victim conscious or unconscious?
C. Do the symptoms indicate decompression sickness (bends) or air embolism?
D. Signs and Symptoms
E. Allergies
F. Medications
G. Pre-existing conditions
H. Last oral intake (what and time)
I. Events leading up to incident
J. Is the victim arriving by auto, ambulance or helicopter? If auto, give make, model, license number
K. Victim's full name, age, sex, dive profile and estimated time of arrival
L. Give your name and the victim's emergency contact information
M. What actions are being taken
N. Transport the victim to the nearest hospital

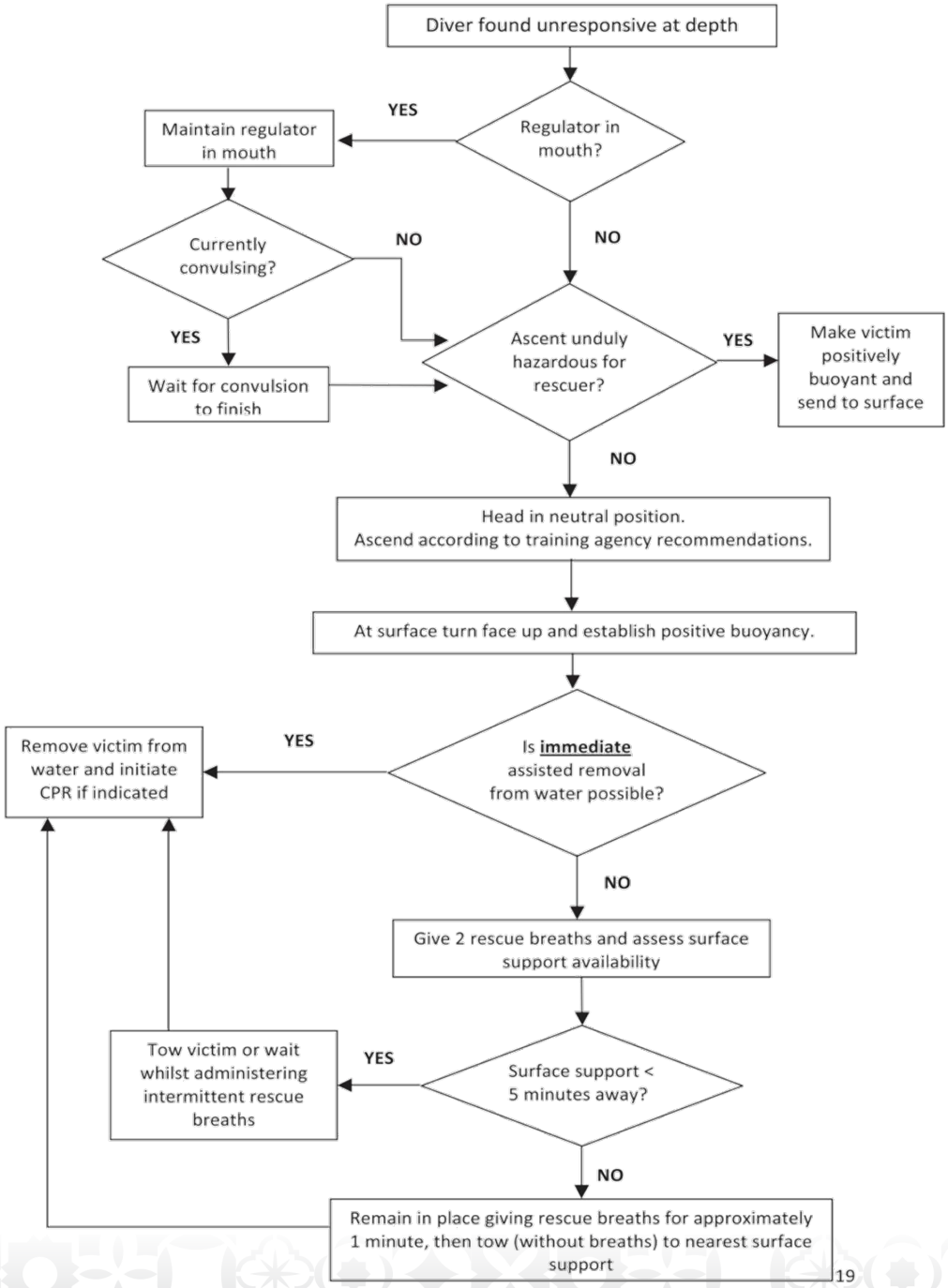
Contacting DAN Emergency hotline

In the event of a diving accident, be prepared to answer the questions from “contacting Emergency Services” and the following, do not delay contacting DAN while obtaining the information:

A. Number of victim(s)
B. DAN policy number of victim(s)
C. Is the victim conscious or unconscious?
D. Do the symptoms indicate decompression sickness (bends) or air embolism?
E. Is the victim arriving by auto, ambulance or helicopter? If auto, give make, model, license number
F. Victim's full name, age, sex, dive profile and estimated time of arrival
G. Give your name and the victim's emergency contact information
H. What actions are being taken
I. Transport the victim to the nearest hospital

Appendix 6c: Recommendations For Rescue Of A Submerged Unresponsive Compressed-Gas Diver

From: S.J. Mitchell et al. , Undersea and Hyperbaric Medicine 2012, Vol. 39, No. 6, pages 1099-1108



Appendix 8: Request for diving reciprocity form verification of diver training and experience

This letter serves to verify that the _____ has met the training and pre-requisites as indicated below, and has completed all requirements necessary to be certified as a (Scientific Diver / Diver in Training) as established by the Texas A&M University - San Antonio (A&M-SA) Diving Standards for Underwater Operations, and has demonstrated competency in the indicated areas. A&M-SA meets or exceeds all AAUS training requirements.

The following is a brief summary of this diver's personnel file regarding dive status as of

_____

(Date)

_____ Original diving authorization

_____ Written scientific diving examination

_____ Last diving medical examination Medical examination Exp. date _____

_____ Most recent checkout dive

_____ SCUBA regulator/equipment service/test

_____ CPR training (Agency) _____ CPR Exp. _____

_____ Oxygen administration (Agency) _____ O_2 Exp. _____

_____ First aid for diving _____ First Aid Exp. _____

_____ Date of last dive; Depth _____

Number of dives completed within previous 12 months? _____

Depth Certification _____ Depth Authorization _____

Total number of career dives? _____

Any restrictions or Waivers of Requirements? (Y/N) _____ if yes, explain:

Please indicate any pertinent authorizations or training:

TEXAS A&M UNIVERSITY-SAN ANTONIO

Dive Program

Emergency Information

Name: Relationship:

Telephone: (work) (home)

Address:

This is to verify that the above information is complete and correct

Dive Safety Officer:

_____ _____

Signature Date

_____

Print

Diver Medical | Participant Questionnaire

Recreational scuba diving and freediving requires good physical and mental health. There are a few medical conditions which can be hazardous while diving, listed below. Those who have, or are predisposed to, any of these conditions, should be evaluated by a physician. This Diver Medical Participant Questionnaire provides a basis to determine if you should seek out that evaluation. If you have any concerns about your diving fitness not represented on this form, consult with your physician before diving. If you are feeling ill, avoid diving. If you think you may have a contagious disease, protect yourself and others by not participating in dive training and/or dive activities. References to "diving" on this form encompass both recreational scuba diving and freediving. This form is principally designed as an initial medical screen for new divers, but is also appropriate for divers taking continuing education. For your safety, and that of others who may dive with you, answer all questions honestly.

Directions

Complete this questionnaire as a prerequisite to a recreational scuba diving or freediving course.
Note to women: If you are pregnant, or attempting to become pregnant, *do not dive*.

1	I have had problems with my lungs, breathing, heart and/or blood affecting my normal physical or mental performance.	Yes ☐ Go to box **A**	No ☐
2	I am over 45 years of age.	Yes ☐ Go to box **B**	No ☐
3	I struggle to perform moderate exercise (for example, walk 1.6 kilometer/one mile in 14 minutes or swim 200 meters/yards without resting), OR I have been unable to participate in a normal physical activity due to fitness or health reasons within the past 12 months.	Yes ☐*	No ☐
4	I have had problems with my eyes, ears, or nasal passages/sinuses.	Yes ☐ Go to box **C**	No ☐
5	I have had surgery within the last 12 months, OR I have ongoing problems related to past surgery.	Yes ☐*	No ☐
6	I have lost consciousness, had migraine headaches, seizures, stroke, significant head injury, or suffer from persistent neurologic injury or disease.	Yes ☐ Go to box **D**	No ☐
7	I am currently undergoing treatment (or have required treatment within the last five years) for psychological problems, personality disorder, panic attacks, or an addiction to drugs or alcohol; or, I have been diagnosed with a learning or developmental disability.	Yes ☐ Go to box **E**	No ☐
8	I have had back problems, hernia, ulcers, or diabetes.	Yes ☐ Go to box **F**	No ☐
9	I have had stomach or intestine problems, including recent diarrhea.	Yes ☐ Go to box **G**	No ☐
10	I am taking prescription medications (with the exception of birth control or anti-malarial drugs other than mefloquine (Lariam).	Yes ☐*	No ☐

Participant Signature

If you answered NO to all 10 questions above, a medical evaluation is not required. Please read and agree to the participant statement below by signing and dating it.

Participant Statement: I have answered all questions honestly, and understand that I accept responsibility for any consequences resulting from any questions I may have answered inaccurately or for my failure to disclose any existing or past health conditions.

Participant Signature (or, if a minor, participant's parent/guardian signature required.) _____ Date (dd/mm/yyyy) _____

Participant Name (Print) _____ Birthdate (dd/mm/yyyy) _____

Instructor Name (Print) _____ Facility Name (Print) _____

* **If you answered YES** to questions 3, 5 or 10 above **OR** to any of the questions on page 2, please read and agree to the statement above by signing and dating it **AND take all three pages of this form (Participant Questionnaire and the Physician's Evaluation Form) to your physician** for a medical evaluation. Participation in a diving course requires your physician's approval.

Participant Name **Birthdate**

(Print) Date (dd/mm/yyyy)

Diver Medical | Participant Questionnaire Continued

BOX A – I HAVE/HAVE HAD:		
Chest surgery, heart surgery, heart valve surgery, an implantable medical device (eg, stent, pacemaker, neurostimulator), pneumothorax, and/or chronic lung disease.	Yes ☐*	No ☐
Asthma, wheezing, severe allergies, hay fever or congested airways within the last 12 months that limits my physical activity/exercise.	Yes ☐*	No ☐
A problem or illness involving my heart such as: angina, chest pain on exertion, heart failure, immersion pulmonary edema, heart attack or stroke, OR am taking medication for any heart condition.	Yes ☐*	No ☐
Recurrent bronchitis and currently coughing within the past 12 months, OR have been diagnosed with emphysema.	Yes ☐*	No ☐
Symptoms affecting my lungs, breathing, heart and/or blood in the last 30 days that impair my physical or mental performance.	Yes ☐*	No ☐

BOX B – I AM OVER 45 YEARS OF AGE AND:		
I currently smoke or inhale nicotine by other means.	Yes ☐*	No ☐
I have a high cholesterol level.	Yes ☐*	No ☐
I have high blood pressure.	Yes ☐*	No ☐
I have had a close blood relative die suddenly or of cardiac disease or stroke before the age of 50, OR have a family history of heart disease before age 50 (including abnormal heart rhythms, coronary artery disease or cardiomyopathy).	Yes ☐*	No ☐

BOX C – I HAVE/HAVE HAD:		
Sinus surgery within the last 6 months.	Yes ☐*	No ☐
Ear disease or ear surgery, hearing loss, or problems with balance.	Yes ☐*	No ☐
Recurrent sinusitis within the past 12 months.	Yes ☐*	No ☐
Eye surgery within the past 3 months.	Yes ☐*	No ☐

BOX D – I HAVE/HAVE HAD:		
Head injury with loss of consciousness within the past 5 years.	Yes ☐*	No ☐
Persistent neurologic injury or disease.	Yes ☐*	No ☐
Recurring migraine headaches within the past 12 months, or take medications to prevent them.	Yes ☐*	No ☐
Blackouts or fainting (full/partial loss of consciousness) within the last 5 years.	Yes ☐*	No ☐
Epilepsy, seizures, or convulsions, OR take medications to prevent them.	Yes ☐*	No ☐

BOX E – I HAVE/HAVE HAD:		
Behavioral health, mental or psychological problems requiring medical/psychiatric treatment.	Yes ☐*	No ☐
Major depression, suicidal ideation, panic attacks, uncontrolled bipolar disorder requiring medication/psychiatric treatment.	Yes ☐*	No ☐
Been diagnosed with a mental health condition or a learning/developmental disorder that requires ongoing care or special accommodation.	Yes ☐*	No ☐
An addiction to drugs or alcohol requiring treatment within the last 5 years.	Yes ☐*	No ☐

BOX F – I HAVE/HAVE HAD:		
Recurrent back problems in the last 6 months that limit my everyday activity.	Yes ☐*	No ☐
Back or spinal surgery within the last 12 months.	Yes ☐*	No ☐
Diabetes, either drug or diet controlled, OR gestational diabetes within the last 12 months.	Yes ☐*	No ☐
An uncorrected hernia that limits my physical abilities.	Yes ☐*	No ☐
Active or untreated ulcers, problem wounds, or ulcer surgery within the last 6 months.	Yes ☐*	No ☐

BOX G – I HAVE HAD:		
Ostomy surgery and do not have medical clearance to swim or engage in physical activity.	Yes ☐*	No ☐
Dehydration requiring medical intervention within the last 7 days.	Yes ☐*	No ☐
Active or untreated stomach or intestinal ulcers or ulcer surgery within the last 6 months.	Yes ☐*	No ☐
Frequent heartburn, regurgitation, or gastroesophageal reflux disease (GERD).	Yes ☐*	No ☐
Active or uncontrolled ulcerative colitis or Crohn's disease.	Yes ☐*	No ☐
Bariatric surgery within the last 12 months.	Yes ☐*	No ☐

*Physician's medical evaluation required (see page 1).

Diver Medical | Medical Examiner's Evaluation Form

Participant Name (Print) **Birthdate** Date (dd/mm/yyyy)

The above-named person requests your opinion of his/her medical suitability to participate in recreational scuba diving or freediving training or activity. Please visit uhms.org for medical guidance on medical conditions as they relate to diving. Review the areas relevant to your patient as part of your evaluation.

Evaluation Result

☐ Approved – I find no conditions that I consider incompatible with recreational scuba diving or freediving.

☐ Not approved – I find conditions that I consider incompatible with recreational scuba diving or freediving.

Signature of certified medical doctor or other legally certified medical provider

Date (dd/mm/yyyy)

Medical Examiner's Name

(Print)

Clinical Degrees/Credentials

Clinic/Hospital

Address

Phone **Email**

Physician/Clinic Stamp (optional)

Created by the Diver Medical Screen Committee in association with the following bodies:

The Undersea & Hyperbaric Medical Society

DAN (US)

DAN Europe

Hyperbaric Medicine Division, University of California, San Diego

NOAA Form 57-03-30
(06a-20)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC and ATMOSPHERIC ADMINISTRATION

DIVE OPERATIONAL RISK MANAGEMENT

Date	Dive Unit	Dive Location	DM/LD

Pre-Dive Checklist

- ☐ All divers authorized to dive
- ☐ DEAP and DOP completed
- ☐ Each diver informed of assigned duties
- ☐ Each diver's training appropriate for assigned duties
- ☐ Topside personnel understand duties, signals & recall method
- ☐ If applicable, Safe Ship Form (NF 57-03-22) initiated
- ☐ If applicable, repetitive dive designations determined

Safety equipment present and functional, to include:

- ☐ Emergency Oxygen Kit
- ☐ First Aid Kit
- ☐ AED
- ☐ Backboard (optional)
- ☐ Dive Flag(s)
- ☐ No-Decompression Tables

Briefing conducted, to include:

- ☐ Entry and exit points identified
- ☐ Maximum depth and bottom time
- ☐ Unique hazards identified & mitigation discussed
- ☐ Recall method discussed
- ☐ 500 psi post-dive pressure rule
- ☐ COVID-19 symptom query (Temp >100.4F, cough, aches, loss of taste/smell, shortness of breath

	Risk Levels						
Risk Factors	**1 Very Low**	**2-3 Low**	**4-5 Medium**	**6-7 Medium-High**	**8-9 High**	**10 Very High**	**Risk Score**
Resources:	Excellent	Very Good	Good	Marginal	Poor	Very Poor	
Underwater Conditions:	Very Forgiving	Forgiving	Moderately Forgiving	Unforgiving	Very Unforgiving	Dangerous	
Surface Conditions:	Excellent	Very Good	Good	Marginal	Poor	Very Poor	
Team Selection:	Excellent Team	Good Team	Adequate Team	Marginal Team	Poor Team	Very Poor Team	
Team Fitness:	Excellent Fitness	Good Fitness	Adequate Fitness	Marginal Fitness	Poor Fitness	Very Poor Fitness	
Mission Complexity:	Simple	Standard	Moderately Complex	Complex	Very Complex	Extremely Complex	
GREEN	**Sum = 0-23 – Low Risk: Proceed with operations, continue to monitor conditions.**					**GAR SCORE:**	
AMBER	**Sum = 24-44 – Medium Risk: Proceed with operations and vigilantly monitor conditions for deterioration.**						
RED	**Sum = 45-60 – High Risk: Postpone operations. Consult supervisors for approval if operation cannot be postponed.**						

Note: If any two scores ≥ 7 or one score ≥ 8, regardless of total score, postpone operation and evaluate cause for high scores. If unable to mitigate, seek higher level approval before proceeding.

Post-Dive Checklist

- ☐ Dive buddies have remained together for 30 min
- ☐ Personal and support gear cleaned and stowed
- ☐ If applicable, Safe Ship Form (NF 57-03-22) completed
- ☐ Post-dive debriefing conducted including flying after diving procedures

Name of person completing ORM

Date

NOAA DIVING PROGRAM
Operational Risk Management (GAR Model)

Note: Examples are not hard limits, they are intended to be examples of conditions representative of corresponding risk.

	Risk Factor Levels						
Risk Factor	**0-1 Very Low**	**2-3 Low**	**4-5 Medium**	**5-6 Medium-High**	**7-8 High**	**9-10 Very High**	**Risk Score**
Resources: Diving and Support Equipment, Rescue Response, Communications	**Excellent**	**Very Good**	**Good**	**Marginal**	**Poor**	**Very Poor**	
	All systems operational. <20 min rescue response, excellent cell phone comms.	All systems operational. <45 min rescue response, good cell phone comms.	All necessary systems operational. 60 - 90 min rescue response, good VHF comms.	Sub-optimal condition of some systems but operational. 1 - 2 hr rescue response. Limited VHF comms.	Sub-optimal condition of some systems but operational. >2 hr rescue response, good Sat phone comms.	Sub-optimal condition of some systems but operational. >6 hr rescue response, marginal Sat phone comms.	
Underwater Conditions: Depth, Temperature, Visibility, Current, Tides, Marine Life	**Very Forgiving**	**Forgiving**	**Moderately Forgiving**	**Unforgiving**	**Very Unforgiving**	**Dangerous**	
	Protected water, bottom <60 fsw, water temp >75 F, current <0.25 kts, visibility >40 ft, minimal marine life risk.	Sheltered water, bottom <80 fsw, water temp >70 F, current <0.5 kts, visibility >30 ft, minimal marine life risk.	Open water, bottom <100 fsw, water temp >65 F, current <0.75 kts, visibility >20 ft, moderate marine life risk.	Open ocean, bottom <130 fsw, water temp >60 F, current <1 kt, visibility >10 ft, moderate marine life risk.	Open ocean, bottom <150 fsw, water temp >50 F, current <2 kts, visibility >5 ft, significant marine life risk.	Open ocean, unreachable bottom, water temp <50 F, current >2 kts, visibility <5 ft, significant marine life risk.	
Surface Conditions: Wind and Sea State, Weather Forecast, Vessel Traffic	**Excellent**	**Very Good**	**Good**	**Marginal**	**Poor**	**Very Poor**	
	Calm wind and seas, forecast good, minimal traffic.	<2 ft seas and/or 5-10 knot winds, forecast fair, occasional traffic.	2-3 ft seas and/or 10-15 knot winds, forecast fair, periodic traffic.	3-4 ft seas and/or 10-15 knot winds, forecast marginal, frequent traffic.	4-5 ft seas and/or 15-20 knot winds, forecast poor, frequent heavy traffic.	>5 ft seas and/or >20 knot winds, forecast poor, frequent and unpredictable heavy traffic.	
Team Selection: Experience, training and familiarity, safe manning levels	**Excellent Team**	**Very Good Team**	**Appropriate Team**	**Marginal Team**	**Poor Team**	**Very Poor Team**	
	Expert divers and support personnel, fully trained and familiar with operation.	Well quallified divers and support personnel, fully trained and familiar with operation.	Qualified divers and support personnel, adequately trained and familiar with operation.	Marginal divers and support personnel, adequately trained and familiar with operation.	Marginal divers and support personnel, adequately trained and familiar with operation.	Marginal divers and support personnel, adequately trained but unfamiliar with ops.	
Team Fitness: Physical and mental fitness of Divers, Topside Support, Vessel Crew	**Excellent Fitness**	**Good Fitness**	**Appropriate Fitness**	**Marginal Fitness**	**Poor Fitness**	**Very Poor Fitness**	
	Minimal physical/mental activity required. Team in excellent fitness for required activity. All well rested.	Minor physical/mental activity required. Team is rested. No physical/mental stress observed. Sufficient rest periods scheduled.	Moderate physical/mental activity required. Team able to accomplish tasks with minimal fatigue. Sufficient rest periods scheduled.	Moderate physical/mental activity required. Some fatigue observed. Minimal rest periods scheduled.	Heavy physical/mental activity required. Moderate fatigue observed. Minimal rest periods scheduled.	Heavy physical/mental activity required. Significant fatigue observed. Minimal rest periods scheduled.	
Mission Complexity: New or familiar, special tools or equipment, team size, entry/exit, liveboating	**Simple**	**Standard**	**Moderately Complex**	**Complex**	**Very Complex**	**Extremely Complex**	
	Simple and familiar tasks with no specialized equipment or tasks needed other than basic diving and observation. Easy entry/exit.	Simple but unfamiliar tasks with no specialized equipment or tasks needed other than basic diving and observation. Easy entry/exit.	Moderately complex but familiar tasks with some specialized equipment and skills needed. Moderate entry/exit.	Moderately complex and unfamiliar tasks with some specialized equipment and skills needed. Moderate entry exit.	Complex but familiar tasks requiring specialized tools and techniques in a team operation. Diificult entry/exit.	Complex and unfamiliar tasks requiring specialized tools and techniques in a team operation. Difficult entry/exit.	
						GAR SCORE:	

GREEN (sum = 0-23) – Low Risk: Proceed with operations and continue to monitor conditions.

AMBER (sum = 24-44) – Medium Risk: Proceed with operations and vigilantly monitor conditions for deterioration.

RED (sum = 45-60) – High Risk: Postpone operations. Consult supervisors for approval if operation cannot be postponed.