UC SANTA BARBARA

DIVE SAFETY MANUAL

STANDARDS FOR SCIENTIFIC DIVING

June 2026 Revision

AAUS updates
UC wide updates
UCSB specific updates

DIVING SAFETY PROGRAM

UNIVERSITY OF CALIFORNIA, SANTA BARBARA

FOREWORD

Since 1951 the scientific diving community had endeavored to promote safe, effective diving through self-imposed diver training and education programs. Over the years, manuals for diving safety have been circulated between organizations, revised and modified for local implementation, and have resulted in an enviable safety record. Scientific diving was exempted from the OSHA *Commercial Diving Regulations* upon the evidence of genuine self-control in the scientific community.

This document is drawn from the American Academy of Underwater Sciences (AAUS) Manual for Scientific Diving Certification and Operations of Scientific Diving Programs. The AAUS document represents the minimum safety standards for scientific diving at the present day.

The policies, procedures and standards set forth in this Diving Safety Manual are intended to govern the training and diving operations of all personnel participating in the Certified Scientific Diving Program at the University of California, Santa Barbara. It applies to all divers operating under University auspices, including visiting divers, and to those campus officers responsible for the administration of the SCUBA program.

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VOLUME I

SECTION 1.00
General Policy

1.10 SCIENTIFIC DIVING STANDARDS

Purpose

The purpose of these Scientific Diving Standards is to ensure scientific diving is conducted in a manner that will maximize the protection of scientific divers from accidental injury and/or illness, and to set forth standards for training and certification that will allow a working reciprocity between Organizational Members (OMs or OM), and to give the OM Diving Control Boards a framework to effectively administer their OM scientific diving safety program Fulfillment of these purposes shall be consistent with the furtherance of research and safety, and facilitation of collaborative opportunities between AAUS OMs. Examples of AAUS OMs include, but are not limited to, academic institutions within and outside of the United States, state and federal agencies, zoo and aquariums, non-profits, citizen science groups, and consulting firms. Examples of scientific diving include, but are not limited to, biology, zoology, archaeology, chemistry, educational outreach, oceanography, ecology, medical, and human performance. The type of organization or the scientific discipline does not determine eligibility to apply the scientific diving exemption or to be Organizational Members of AAUS; rather, current membership in AAUS is recognized by the Federal OSHA as meeting all requirements for conducting scientific diving training and operations in the workplace.

By maintaining compliance with this consensual AAUS Standards for Scientific Diving Manual, OMs will avail themselves of the scientific diving exemption set forth in CFR 1910 Subpart T. This does not preclude OMs from employing the outlined Code of Federal Regulations and other state sponsored Occupational Safety and Health program's standards if the diving tasks falls outside of the scientific diving exemption and the guidelines provided therein. OMs that conduct both exempt and non-exempt dive operations must have clear delineations outlined by the OM Diving Control Board.

This Manual sets minimum standards for the establishment of American Academy of Underwater Sciences (AAUS) recognized scientific diving programs, the organization for the conduct of these programs, and the basic regulations and procedures for safety in scientific diving operations. It also establishes a framework for reciprocity between AAUS OMs that adhere to these minimum standards. AAUS considers divers to be scientists or scientists-in-training during or after successful completion of the AAUS-compliant Scientific Diver Course, as they have been trained to the task of data collection and effective methods of observation.

Historical Perspective

This Manual was developed and written by 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 Institution of Oceanography (SIO). Adherence to the SIO standards has proven both feasible and effective in protecting the health and safety of scientific divers since 1954.

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). In 2022, OSHA officially recognized AAUS 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.

Scientific Diving Exemption

The two elements that a diving program must contain as defined by OSHA in 29 CFR 1910 Subpart 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, 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 Diving Control 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.

1.20 OPERATIONAL CONTROL

1.21 University Auspices and Responsibilities

UCSB auspices include any scientific diving operation in which UCSB is connected because of ownership of life support equipment used, locations selected, or relationship with the associated individual(s). This includes all cases involving the operations of authorized individuals of UCSB or auxiliary organizations, where such individuals are acting within the scope of their authorization.

It is UCSB's responsibility to adhere to the AAUS Standards for Scientific Diving Certification and Operation of Scientific Diving Programs. The administration of the local diving program will reside with the DSO in consultation with the UCSB Diving Control Board. The regulations herein shall be observed at all locations where scientific diving is conducted.

1.22 UCSB Scientific Diving Standards and Safety Manual

UCSB shall develop and maintain a Diving Safety Manual (DSM), which provides for the development and implementation of policies and procedures that will enable UCSB to meet requirements of local environments and conditions as well as to comply with the AAUS minimum standards.

1.23 The Diving Control Board

A. *Composition*
The Diving Control Board (DCB) shall consist of a majority of active scientific divers. Voting members shall include the Diving Safety Officer (DSO), the responsible administrative officer, or their designee, and should include other representatives of the diving program. A chairperson and a secretary may be chosen from the membership of the board according to DCB procedure. A representative of EH&S will be an ex-officio member.

B. *Authority*
The DCB shall have autonomous authority over the UCSB Scientific Diving Program

C. *Responsibilities*

The DCB is responsible for setting policy and shall:

1. Act as a board of appeal to consider diver-related problems.
2. Periodically review the DSO's performance and program.
3. Sit as a board of investigation to inquire into the nature and cause of diving accidents or violations of UCSB diving manual.

4. Acting through the DSO, the DCB shall oversee the following:
    i. Establish additional standards, protocols, and operational procedures beyond the AAUS minimums to address OM specific needs and concerns.
    ii. Approve and monitor diving projects.
    iii. Review and revise the diving safety manual.
    iv. Ensure compliance with the diving safety manual.
    v. Approve the depth to which a diver has been authorized to dive.
    vi. Take disciplinary action for unsafe practices.
    vii. Ensure adherence to the buddy system for scientific diving.
    viii. Act as the official representative of the OM in matters concerning the scientific diving program.
    ix. Act as a board of appeal to consider diver-related problems.
    x. Recommend the issue, reissue, or the revocation of diving authorizations.
    xi. Recommend changes in policy and amendments to AAUS and the OM's diving safety manual as the need arises.
    xii. Establish and/or approve training protocols or standards through which the applicants for authorization can satisfy the requirements of the OM's diving safety manual.
    xiii. Suspend diving operations considered to be unsafe or unwise.
    xiv. Establish criteria for equipment selection and use.
    xv. Recommend new equipment or techniques.
    xvi. Establish and/or approve facilities for the inspection and maintenance of diving and associated equipment.
    xvii. Ensure that the OM's air station(s) meet air quality standards in this manual.
    xviii. Periodically review the DSO's performance and program.
    xix. Investigate diving incidents within the OM's diving program or violations of the OM's diving safety manual.
5. The DCB may delegate operational oversight for portions of the program to the DSO; however, the DCB may not abdicate responsibility for the safe conduct of the diving program.

1.24 The Diving Safety Officer

The Diving Safety Officer (DSO) serves as a member of the DCB. This person should have broad technical and scientific expertise in research related diving.

A. *Qualifications*

1. Shall be an active scuba instructor from an internationally recognized certifying agency.
2. Shall be appointed by the responsible administrative officer or designee, with the advice and counsel of the DCB.
3. Shall qualify as a Full Voting Member of AAUS as defined by AAUS Bylaws.
4. Shall attend an AAUS DSO Orientation within one year of accepting a position at an AAUS approved OM, unless they have has served as a DSO for another current AAUS OM within the last year.

B. *Duties and Responsibilities*

1. Answers, through the DCB, to the appropriate administrative officer or designee, for the conduct of the scientific diving program of the OM.
2. If delegated by the DCB, the routine operational authority for this program rests with the DSO. This oversight includes, but is not limited to: training, diver authorizations, approval of dive plans, maintenance of diving records, and ensuring compliance with this Manual.
3. May permit some duties and responsibilities to be carried out by a qualified delegate, with the approval of the DCB.

4. Shall be guided in the performance of the required duties by the advice of the DCB, but operational responsibility for the conduct of the scientific diving program will be retained by the DSO.
5. Shall suspend diving operations determined to be unsafe or unwise.

1.25 Instructional Personnel

A. *Qualifications*
All personnel involved in diving instruction under the auspices of UCSB shall be qualified for the type of instruction being given.

B. *Selection*
The administrative officer responsible, or a designee, who will solicit the advice of the DCB in conducting preliminary screening of applicants for instructional positions, will select instructional personnel.

1.26 Reciprocity and Visiting Scientific Diver

A. Two or more AAUS organizational members engaged jointly in diving activities, or engaged jointly in the use of diving resources, shall designate one of the participating DCBs to govern the joint dive project. However, responsibility for individual divers ultimately resides with the diver's home OM.

B. A scientific diver from an organizational member shall apply for permission to dive under the auspices of another organizational member by submitting to the Diving Safety Officer of the host organizational member a document containing all the information described in Appendix 4, approved by the DSO or Chairperson of the home DCB.

C. A visiting scientific diver may be asked to demonstrate their knowledge and skills for the planned diving.

D. If a host organizational member denies a visiting scientific diver permission to dive, the host DCB shall notify the visiting scientific diver and their DCB with an explanation of all reasons for the denial.

1.27 Waiver of Requirements

The DCB may grant a waiver for specific requirements of training, examinations, depth authorization, and minimum activity to maintain authorization.

1.30 CONSEQUENCES OF VIOLATION OF REGULATIONS BY SCIENTIFIC DIVERS

Failure to comply with the regulations of the UCSB diving manual may be cause for the revocation or restriction of the diver's scientific diving certificate by action of the UCSB DCB.

1.40 CONSEQUENCES OF VIOLATION OF REGULATIONS BY UCSB

Failure to comply with the regulations of this standard may be cause for the revocation or restriction of UCSB recognition by the AAUS.

SECTION 2.00
Diving Regulations for SCUBA (Open Circuit, Compressed Air)

2.10 Introduction

No person shall engage in scientific diving operations under the auspices of the UCSB scientific diving program unless they are authorized pursuant to the provisions of this *Manual*.

2.20 Pre-Dive Procedures

Dive Plans

Before conducting any diving operations under the auspices of UCSB, a dive plan for the proposed project or dive must be formulated and submitted and approved by the DCB, or designee, prior to the start of any diving activities. Dives should be planned around the competency of the least experienced diver. The dive plan (project or individual) should include the following:

- Diving Mode(s) and Gas(es)
- Divers' authorizations
- Approximate number of proposed dives
- Location(s) of proposed dives
- Estimated depth(s) and bottom time(s) anticipated
- Decompression status and repetitive dive plans, if required
- Proposed work, equipment, and boats to be employed
- Any hazardous conditions anticipated
- Emergency Action Plan (Appendix 5)
- In water details of the dive plan should include:
    - Dive Buddy assignments and tasks
    - Goals and objectives
    - Maximum depth(s) and bottom time
    - Gas management plan
    - Entry, exit, descent and ascent procedures
    - Perceived environmental and operational hazards and mitigations
    - Emergency and diver recall procedures

Diver Responsibility and Refusal to Dive

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 their judgment, conditions are unsafe or unfavorable, or if they would be violating the precepts of regulations in this *Manual*.

No dive team member will be required to be exposed to hyperbaric conditions against their will.

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

Pre-dive Safety Checks

- 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.
- Scientific divers must conduct a functional check of their diving equipment in the presence of the dive buddy or tender. They must ensure the equipment is functioning properly and suitable for the type of diving operation being conducted.
- Each diver must have the capability of achieving and maintaining positive buoyancy at the surface.
- Environmental conditions at the site will be evaluated prior to entering the water.

Pre-dive Briefings

Before conducting any diving operations under the auspices of UCSB, the dive team members must be briefed on:

- Dive Buddy assignments and tasks
- Dive objectives.
- Maximum depth(s) and bottom time
- Turn around pressure and required surfacing pressure
- Entry, exit, descent and ascent procedures
- Perceived environmental and operational hazards and mitigations
- Emergency and diver recall procedures

Emergency Procedures

Scientific diving shall not be conducted unless the emergency plan information is complete and has been approved by the DCB, or designee. The Lead Diver must ensure that first aid emergency, communication devices and oxygen administration equipment are in working order and available as described within the emergency plan.

2.30 Diving Procedures

UC Scientific Dive Leadership and Training Defined

Scientific Diving Projects require three distinct leadership roles. While it's possible for one person to fill all three roles, the Diving Control Board (DCB) / Diving Safety officer (DSO) determines who is authorized for each role during the dive plan approval process.

To be authorized, a diver must demonstrate to the DCB, through the DSO, that they are sufficiently skilled and proficient, and possess the necessary judgement for their safety and/or that of the dive team.

Levels of Scientific Dive Leadership

Diving Project—Project Dive Lead

Primary point of contact with the DSO
Development of dive plan
Ensures all divers meet training requirements
Appoints On-Site Dive Leader

Diving Operation—On-Site Dive Leader

Appointed by Project Dive Lead
Person in charge of the day-to-day dive activities
Generally, a highly qualified scientific diver who may or may not be diving

Dive—Buddy Team Leader

For each dive, the buddy team leader is in charge of equipment, positioning, navigation, monitoring air and time, and communication with the On-Site Dive Leader.

Minimum qualifications for authorization of Project Dive Lead, On-Site Dive Leader, and Buddy Team Leader include successful completion of the AAUS eLearning Dive Module and additional requirements determined by the DCB.

On-Site Dive Leader authorizations should be based on the following

1. Experience
2. Familiarity with the project or science
3. Complexity of the project or science
4. Equipment and tools to be used
5. Communication skills (with divers, with Dive Program Staff)
6. Judgement (subjective)

The DCB/DSO may determine that additional oversight may be required based on project factors such as:

1. Group Size
2. Remoteness
3. Tools & Modes
4. Environmental
5. Complex Collaborations

On-Site Dive Leader

For each diving operation, one individual shall be designated as the On-Site Dive Leader. This person shall be at the dive location during the entire diving operation. The On-Site Dive Leader shall be responsible for:

A. **Coordination**. Diving shall be coordinated with other known activities in the vicinity which are likely to affect diving operations. The On-Site Dive Leader shall suspend diving operations if in their opinion conditions are not safe.

C. **Briefing**. The dive team members shall be briefed on:

1. Dive objectives;
2. Unusual hazards or environmental conditions likely to affect the safety of the diving operation;
3. Modifications to diving or emergency procedures necessitated by the specific diving operation; and,
4. Reporting any physical problems or adverse physiological effects, including symptoms of pressure related injuries.

D. **Dive Planning**. Planning of a diving operation shall in accordance of this manual and include considerations of the safety and health aspects of the divers.

1. Diving mode;
2. Surface and underwater conditions and hazards;
3. Breathing gas supply;
4. Thermal protection;
5. Diving equipment;
6. Ensuring all dive team members are qualified for the type of diving operations;
7. Residual inert gas status of dive team members;
8. Decompression schedules and altitude corrections; and,
9. Emergency procedures.

E. **Emergency Equipment.** The On-Site Dive Leader must ensure that emergency equipment is present.

Buddy Diving Requirements and Solo Diving Prohibition

All diving activities shall assure adherence to the buddy system (two or three suitably equipped divers that shall be in effective communication throughout the dive). This buddy system is based upon mutual assistance, especially in the case of an emergency. Exceptions to this policy may be made by the DSO/DCB, particularly in the case of surface supported diving and diving in overhead environments. For each dive, the Buddy Team Leader is in charge of equipment, positioning, navigation, monitoring air and time, and communication with the On-Site Dive Leader.

Termination of the Dive

Any dive must be terminated 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.

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.

Emergencies and Deviations from Regulations

Any diver may deviate from the requirements of this *Manual* 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 DCB explaining the circumstances and justifications.

Enclosed or Confined Spaces

Where an enclosed or confined space is not large enough for two divers, a diver shall be stationed at the underwater point of entry and an orientation line shall be used.

Dive Flags

A dive flag shall be displayed prominently over the dive site whenever diving is conducted.

Dive Computers and Dive Tables

The use of dive computers or dive tables as a means of determining decompression status is required for all dives conducted under the auspices of UC Santa Barbara. The use of a dive computer should follow the UCSB recommendations on dive computers.

Depth Limits

A. Each scientific diver shall be certified to a specific depth limit by the DSO.

B. Each scientific diver diving under the auspices of the Consortium shall not exceed their depth authorization, unless accompanied by a diver certified to a greater depth. Under these circumstances the diver may not exceed their depth limit by more than one step.

2.40 Post-Dive Procedures

After the completion of a dive, each diver must report any physical problems, symptoms of decompression sickness, or equipment malfunctions to the On-Site Dive Leader, DSO, and/or DCB.

It is the responsibility of each buddy team member to inform the On-Site Dive Leader if they have any concerns with aspects of the dive operation as conducted during the dive. Operations will not continue until those concerns have been addressed to the satisfaction of the buddy team and On-Site Dive Leader. If needed, the team should contact the DSO for assistance in addressing any concern(s) with the dive operation.

2.50 Emergency Procedures

Each Project Dive Lead will develop emergency procedures which follow the standards of care of the community and must include procedures and implementation criteria for emergency care, recompression, evacuation, and incident reporting.

2.60 Flying after Diving or Ascending to Altitude (Over 2000 feet))

- Following a Single No-Decompression Dive: Divers should have a minimum preflight surface interval of 12 hours.
- Following Multiple Dives per Day or Multiple Days of Diving: Divers should have a minimum preflight surface interval of 18 hours.
- Following Dives Requiring Decompression Stops: Divers should have a minimum preflight surface interval of 24 hours.
- Before Ascending to Altitude Above 2000 feet (304 meters): Divers should follow the appropriate guideline for preflight surface intervals unless the decompression procedure used has accounted for the increase in elevation.

2.70 Record Keeping Requirements

Personal Diving Log

Each authorized scientific diver must log every dive made under the auspices of the UCSB's program and is encouraged to log all other dives. Dives should be logged into Webdiver at the earliest reasonable opportunity but no later than 1 month following the dive. The dive log shall include at least the following:

- Name of diver and buddy
- Date, time, and location
- Diving modes used
- General nature of diving activities
- Maximum depth and dive time
- Diving tables or computers used
- Detailed report of any near or actual incidents

Required Incident Reporting

All diving incidents shall be reported to the UCSB DSO in a timely manner. All occupational injuries and illnesses should follow established UCSB procedures for incident reporting, including those required by the AAUS and the appropriate Labor Code section. The report will specify the circumstances of the incident and the extent of any injuries or illnesses. The DCB shall investigate and document any incident of pressure related injury and prepare a report that is to be forwarded to AAUS during the annual reporting cycle.

- If pressure-related injuries are suspected, or if symptoms are evident, the following additional information must be recorded and retained by the OM, with the record of the dive, for a period of 5 years:
- Written descriptive report shall include:
    - Name, address, phone numbers of the principal parties involved.
    - Summary of experience of divers involved.
    - Location, description of dive site, and description of conditions that led up to incident.
    - The circumstances of the incident and the extent of any injuries or illnesses.
    - Description of symptoms, including depth and time of onset.
    - Description and results of treatment.
    - Disposition of case.
    - Recommendations to avoid repetition of incident.

- The DCB shall investigate and document any incident of pressure-related injury and prepare a report, which is to be forwarded to the AAUS during the annual reporting cycle. This report shall first be reviewed and released by the UCSB DCB.

Recommended Near-Miss Reporting

Near-Misses should be reported to the Diving Safety Office in a timely manner using the 'UC Diving Safety Near Miss Report Form.' The UCSB Diving Safety Officer will review submissions with the UCSB Diving Control Board and share valuable lessons in a redacted format with the UCSB Scientific Diving Community.

It is also recommended that near-misses be reported to the AAUS in a timely manner, utilizing the Near-Miss Report Form that can be found on the AAUS website.

Near-Misses may be reported by any Scientific Diver. It is recommended that Near-Miss reports be generated by the OM DSO and/or DCB. AAUS reserves the right to contact the reporting OM DSO/DCB regardless of who reports the near-miss.

See definitions and the incident rating scale in Appendix 9

SECTION 3.00
Diving Equipment

3.10 General Policy

All equipment must meet standards as determined by the DSO and the DCB. All equipment must be regularly examined by the person using it and serviced according to manufacturer recommendations. Equipment that is subjected to extreme usage under adverse conditions should require more frequent testing and maintenance.

3.20 Equipment

The UCSB DCB must establish the minimum equipment configuration for all dives.

Regulators and Gauges

- SCUBA regulators and gauges must be inspected and tested prior to each use and serviced, at a minimum, according to manufacturer's recommendations
- Standard open circuit (OC) regulator configuration is:
  - A first stage
  - Primary 2nd stage
  - Back up 2nd stage
  - Submersible Pressure Gauge (SPG)
  - Inflator hose for a Buoyancy Compensator Device
- A Full Face Mask may be used in place of the primary 2nd stage according to manufacturer's recommendations

Equipment for Determination of Decompression Status

- Each member of the buddy team must have an underwater timing device and depth indicator, or dive computer
- If dive tables are being used a set must be available at the dive location
- If a dive computer is used the diver must use the same computer used on repetitive dives.
- In an aquarium or other human-made structure of a known maximum obtainable depth:
  - A depth indicator is not required, except when a diver's decompression status must be taken into consideration on repetitive dives.
  - Only one buddy must be equipped with a timing device.
  - The maximum obtainable depth of the aquarium must be used as the diving depth.

SCUBA Cylinders

- SCUBA cylinders must be designed, constructed, and maintained in accordance with the applicable provisions of the Unfired Pressure Vessel Safety Orders.
- SCUBA cylinders must be hydrostatically tested in accordance with DOT standards.
- SCUBA cylinders must have an internal and external inspection at intervals not to exceed 12 months.
- SCUBA cylinder valves must be functionally tested at intervals not to exceed 12 months.

Buoyancy Compensation Devices (BCD)

- Each diver must have the capability of achieving and maintaining neutral buoyancy underwater and positive buoyancy at the surface.
- BCDs, dry suits, or other variable volume buoyancy compensation devices must be equipped with an exhaust valve.

- These devices must be functionally inspected and tested at intervals not to exceed 12 months.
- BCDs, dry suits, or other variable volume buoyancy compensation devices must not be used as a lifting device in lieu of lift bags.

3.30 Auxiliary Equipment

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

- Sampling Equipment
- Organism & Tissue Collection Tools - Spearguns & Pole Spears
- Cameras - Still & Video
- Small Hand Tools
- Handheld Underwater Power Tools
- Line Reels & Spools
- Surface Maker Buoys
- Lift Bags
- Full Face Masks
- Diver Propulsion Vehicles (DPVs)

***See App. 7 for Equipment Descriptions, Examples of Use and Pertinent Safety Considerations*

3.40 Support Equipment

First Aid Supplies

- A first aid kit and emergency oxygen appropriate for the diving being conducted must be available at the dive site.

Diver's Flag

- A diver's flag must be displayed prominently whenever diving is conducted under circumstances where required or where water traffic is probable.

Compressor Systems - Organizational Members Controlled

The following will be considered in design and location of compressor systems:

- Low-pressure compressors used to supply air to the diver if equipped with a volume tank must have a check valve on the inlet side, a relief valve, and a drain valve.
- Compressed air systems over 500 psig must have slow-opening shut-off valves.
- All air compressor intakes must be located away from areas containing exhaust or other contaminants.

3.50 Equipment Maintenance

Record Keeping

Each equipment modification, repair, test, calibration, or maintenance service must be logged, including the date and nature of work performed, serial number of the item (if applicable), and the name of the person performing the work for the following equipment:

- Regulators
- Gauges (SPG, Depth Gauges, Timers, and Dive Computers)

- BCDs
- Dry suits
- SCUBA cylinders and valves
- Full Face Masks
- Compressors, air filtration systems, gas control panels, and storage banks
- Surface supplied equipment
- Rebreather systems
- Additional equipment categories as determined by the DCB

Compressor Operations and Air Test Records

Gas analyses and air tests must be performed on each OM-controlled breathing air compressor at regular intervals of no more than 100 hours of operation or 6 months, whichever occurs first. The results of these tests must be entered in a formal log and be maintained.

3.40 AIR QUALITY STANDARDS

Breathing air for scuba shall meet the following specifications as set forth by the Compressed Gas Association (CGA Pamphlet G-7.1)

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	(2)
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.

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

SECTION 4.00
Scientific Diver Authorization Requirements

4.10 GENERAL POLICY

Set forth below are the training requirements for UCSB Scientific Diver authorization. No person shall engage in scientific diving activities under the auspices of UCSB until the DSO, acting on behalf of the DCB, has issued a Scientific Diving Authorization and approved a submitted UCSB Dive Plan.

Submission of documents and participation in aptitude examinations does not automatically result in authorization. The applicant shall convince the DSO that they are sufficiently skilled and proficient to be authorized by the DCB. Any applicant who does not possess the necessary judgment, under diving conditions, for the safety of the diver and their partner, may be denied UCSB Scientific Diver privileges.

4.20 PREREQUISITES

4.21 Eligibility

A. Only persons diving under UCSB auspices are eligible for UCSB Scientific Diver training and authorization. Generally, these people will be affiliated with UCSB however non-affiliated trainees may be admitted to the training program with the permission of the DCB.

B. The applicant for training and authorization should be at least eighteen years of age, have at least entry level SCUBA training from an internationally recognized agency and at a minimum of 12 logged dives since the entry level training was completed.

4.22 Application

Application for authorization should be submitted to the DSO and the application form is available on UCSB's Dive Safety website.

4.23 Medical Evaluation

The candidate shall be medically qualified for diving as described by American Academy of Underwater Sciences medical standards and these may not be waived.

4.24 Swimming and Skin Diving Evaluation

The candidate shall demonstrate the following in the presence of the DSO or designee. All tests are to be performed without swim aids. However, where exposure protection is needed, the candidate shall be appropriately weighted to provide for neutral buoyancy

1. Swim underwater without fins for a distance of 25 yards without surfacing.
2. Swim 400 yards in less than 12 minutes without fins, demonstrating 2 strokes.
3. Tread water for 15 minutes without swim aids and for 5 of those minutes without hands.
4. Demonstrate swimming with snorkel and fins with and without a mask.
5. Surface dive without fins to a depth of about 10-15 feet and recover a 10 lb weight.
6. Without fins, transport a passive swimmer and tow the swimmer 25 yards in the water.

4.30 TRAINING

The candidate must successfully complete prerequisites, theoretical aspects, practical training, and examinations for a minimum cumulative time of 100 hours and a minimum of 12 open water dives. Theoretical aspects must include principles and activities appropriate to the intended area of scientific study. Formats for meeting the 100 hour training requirement include a formalized training course, or a combination of formalized and on the job training.

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. The DCB 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. However, UCSB cannot "test-out" divers, regardless of experience, when they have no previous experience in scientific diving. Any candidate who does not convince the DCB, through the DSO, that they possess the necessary judgment, under diving conditions, for the safety of the diver and their buddy, may be denied UCSB scientific diving privileges.

<table>
<tr><th colspan="2">Theoretical Training / Knowledge Development</th></tr>
<tr><td>Required Topics:</td><td>Suggested Topics:</td></tr>
<tr><td>Diving Emergency Care Training
Cardiopulmonary Resuscitation (CPR)
AED
Standard or Basic First Aid
Recognition of DCS and AGE
Accident Management
Field Neurological Exam
Oxygen Administration</td><td rowspan="2">Specific Dive Modes (methods of gas delivery)
Open Circuit
Hookah
Surface Supplied diving
Rebreathers (closed and/or semi-closed)</td></tr>
<tr><td>Dive Rescue
To include procedures relevant to OM specific protocols. (See water skills below)</td></tr>
<tr><td>Scientific Method</td><td>Small Boat Operation</td></tr>
<tr><td>Data Gathering Techniques
(Only items specific to area of study required)
Transects and Quadrats
Mapping
Coring
Photography
Tagging
Collecting
Animal Handling
Archaeology
Common Biota
Organism Identification
Behavior
Ecology
Site Selection, Location, and Re-location
Specialized Data Gathering Equipment</td><td>Specialized Environments and Conditions
Blue Water Diving
Altitude
Ice and Polar Diving (Cold Water Diving)
Zero Visibility Diving
Polluted Water Diving
Saturation Diving
Decompression Diving
Overhead Environments
Aquarium Diving
Night Diving
Kelp Diving
Strong Current Diving
Potential Entanglement/Entrapment
Live boating</td></tr>
<tr><td>Required Topics:</td><td>Suggested Topics:</td></tr>
<tr><td>Navigation</td><td rowspan="2">HazMat Training
Chemical Hygiene, Laboratory Safety (Use of Chemicals)</td></tr>
<tr><td>HazMat Training
HP Cylinders</td></tr>
<tr><td>Decompression Management Tools
Dive Tables
Dive Computers
PC Based Software</td><td rowspan="4">Specialized Diving Equipment
Full face mask
Dry Suit
Communications
Dive Propulsion Vehicle (DPV)
SMBs/Lift Bags
Line Reels</td></tr>
<tr><td>AAUS Scientific Diving Regulations and History
Scientific Dive Planning
Coordination with other Agencies
Appropriate Governmental Regulations</td></tr>
<tr><td>Hazards of breath-hold diving and ascents</td></tr>
<tr><td>Dive Physics (Beyond entry level scuba)</td></tr>
<tr><td>Dive Physiology (Beyond entry level scuba)</td><td rowspan="3">Other Topics and Techniques as Determined by the DCB</td></tr>
<tr><td>Dive Environments</td></tr>
<tr><td>Decompression Theory and its Application</td></tr>
</table>

<table>
<tr><th colspan="2">Practical Training / Skill Development</th></tr>
<tr><td>Confined Water</td><td>At the completion of training, the trainee shall satisfy the DSO or DCB-approved designee of their ability to perform the following, as a minimum, in a pool or in sheltered water:
Enter water fully equipped for diving
Clear fully flooded face mask
Demonstrate air sharing and ascent using an alternate air source, as both donor and recipient, with and without a face mask
OPTIONAL: Demonstrate buddy breathing as both donor and recipient, with and without a face mask
Demonstrate understanding of underwater signs and signals
Demonstrate ability to remove and replace equipment while submerged
Demonstrate acceptable watermanship skills for anticipated scientific diving conditions</td></tr>
<tr><td rowspan="5">Open Water Skills</td><td>The trainee shall satisfy the DSO, or DCB-approved designee, of their ability to perform at least the following in open water:
Surface dive to a depth of 10 feet (3 meters) without scuba*
Enter and exit water while wearing scuba gear* ^^
Kick on the surface 400 yards (366 meters) while wearing scuba gear, but not breathing from the scuba unit*
Demonstrate proficiency in air sharing ascent as both donor and receiver*
Demonstrate the ability to maneuver efficiently in the environment, at and below the surface*^^
Complete a simulated emergency swimming ascent*
Demonstrate clearing of mask and regulator while submerged*
Underwater communications^^
Demonstrate ability to achieve and maintain neutral buoyancy while submerged*
Demonstrate techniques of self-rescue and buddy rescue*
Navigate underwater ^
Plan and execute a dive^
Demonstrate judgment adequate for safe scientific diving* ^^</td></tr>
<tr><td>Rescue Skills:
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
Demonstrate simulated in-water mouth-to-mouth resuscitation
Removal of victim from water to shore or boat
Stressed and panicked diver scenarios
Recommendations For Rescue of a Submerged Unresponsive Compressed-Gas Diver – Appendix 6</td></tr>
<tr><td>Successfully complete a minimum of one checkout dive and at least eleven additional open water dives in a variety of dive sites, for a cumulative surface to surface time of 6 hours. Dives following the checkout dive(s) may be supervised by an active Scientific Diver holding the necessary depth authorization experienced in the type of diving planned, and with the knowledge and permission of the DSO</td></tr>
<tr><td>The eleven dives (minimum) following the initial checkout dive may be conducted over a variety of depth ranges as specified by the OM DCB. Depth progression shall proceed shallower to deeper after acceptable skills and judgement have been demonstrated, and are not to exceed 100 feet (30 m) during the initial 12 dive cycle</td></tr>
<tr><td>* Checkout dive element
^^ Evaluated on all dives
^ Evaluated at some point during the training cycle</td></tr>
</table>

Examinations	
Equipment	The trainee will be subject to examination/review of: • Personal diving equipment • Task specific equipment • Function and manipulation of decompression computer to be employed by the diver (if applicable)
Written Exams	The trainee shall pass a written examination reviewed and approved by the OM DCB that demonstrates knowledge of at least the following: • Function, care, use, and maintenance of diving equipment • Advanced physics and physiology of diving • Diving regulations • Applicable diving environments • Emergency procedures for OM-specific dive mode(s) and environments, including buoyant ascent and ascent by air sharing • Currently accepted decompression theory and procedures • Proper use of dive tables • Hazards of breath-hold diving and ascents • Planning and supervision of diving operations • Navigation • Diving hazards & mitigations • Cause, symptoms, treatment, and prevention of the following: near drowning, air embolism, hypercapnia, squeezes, oxygen toxicity, nitrogen narcosis, exhaustion and panic, respiratory fatigue, motion sickness, decompression sickness, hypothermia, and hypoxia/anoxia • Applicable theoretical training and knowledge development from the Required and Suggested Topics (above)

4.40 TYPES OF AUTHORIZATION

Only a person diving under UCSB auspices is eligible for Scientific Diver authorization from the University of California, Santa Barbara.

4.41 Scientific Diver-in-Training (DIT) Authorization

This is an authorization to dive, usable only while it is current and for the purpose intended. This authorization signifies that a diver has completed and been certified as at least an entry level diver through an internationally recognized certifying agency and has the knowledge skills and experience necessary to commence and continue training as a scientific diver under supervision, as approved by the DCB. DIT status must only be used when the diver is on their way to becoming authorized 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 authorization.

4.42 Scientific Diver Authorization

Signifies a diver has completed all requirements in Section 4.00 and is authorized by the AAUS OM to engage in scientific diving without supervision, as approved by the DCB through the DSO. Submission of documents and participation in aptitude examinations does not automatically result in certification. To be authorized, the applicant must demonstrate to the DCB, through the DSO, that they are sufficiently skilled and proficient, and possess the necessary judgment for their safety and/or that of the dive team. Scientific Diver authorizations are only active when required authorizations are in place and current.

4.43 Scientific Aquarium Diver Authorization

Scientific Aquarium Diver is an authorization enabling a diver to participate in scientific diving solely in the aquarium environment.

All requirements set forth for Scientific Diver authorization must apply; except the following*:*

- Practical training must include at least 12 supervised aquarium dives for a cumulative bottom time of 6 hours.
- Training requirements for navigation and 400-yard (366-meter) surface swim in SCUBA gear may be waived at the discretion of the DCB.

4.43 Temporary Diver Authorization

Only a diver not under the auspices of an AAUS OM may be granted a Temporary Diver Authorization. The individual in question must demonstrate proficiency in diving and can contribute measurably to a planned dive. A Temporary Diver Authorization constitutes a waiver of selected requirements of Section 4.0 and is valid only for a limited time, as approved by the DCB. A Temporary Diver Authorization must be restricted to the planned diving operation and must comply with all other policies, regulations, and standards of this Manual, including medical requirements. This authorization is not to be utilized as a repeated mechanism to circumvent existing standards set forth in this Manual.

4.50 DEPTH AUTHORIZATIONS AND PROGRESSION

Indicates the maximum depth in which a diver can conduct science and may supervise other divers holding a lesser depth authorization. A scientific diver requires a valid depth authorization to be considered active.

A diver may be authorized to the next depth level after successfully completing the requirements for that level. A diver may exceed their depth authorization when accompanied and supervised by a dive buddy holding a depth authorization greater or equal to the intended depth. Dives must be planned and executed with the permission of the DCB or designee.

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

4.51 Authorization to 30 Foot Depth

Initial science diver depth authorization, approved upon the successful completion of training listed in Section 4. Cumulative minimum supervised dives: 12.

4.52 Authorization to 60 Foot Depth

A diver holding a 30-foot 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 DCB, for a minimum total time of 4 hours. Cumulative minimum supervised dives: 24.

4.53 Authorization to 100 Foot Depth

A diver holding a 60-foot 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 DCB. The diver must also demonstrate proficiency in the use of the appropriate decompression profiling method. Cumulative minimum supervised dives: 30.

4.54 Authorization to 130 Foot Depth

A diver holding a 100-foot 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 DCB. The diver must also demonstrate

proficiency in the use of the appropriate decompression profiling method. Cumulative minimum supervised dives: 36.

4.55 Authorization beyond 130 Foot Depth

Divers needing qualification to depths beyond 130ft must apply to the DCB. The diver must also demonstrate a knowledge of the special problems of deep diving, and of special safety requirements.

4.60 CONTINUATION OF SCIENTIFIC DIVER AUTHORIZATION

4.61 Minimum Activity to Maintain Authorization

During any 12-month period, each certified scientific diver shall log a minimum of 12 dives. At least one dive should be logged near the maximum depth, as defined by the DCB, of the diver's authorization during each 6-month period. Divers certified to 150 feet or deeper may satisfy these requirements with dives to 130 feet or over. Failure to meet these requirements may be cause for revocation or restriction of authorization.

4.62 Requalification of Depth Authorization

Once the initial requirements of this manual are met, divers whose depth authorization has lapsed due to lack of activity may be re-qualified by procedures adopted by UCSB's DCB.

4.63 Medical Examination

All certified scientific divers shall pass a medical examination at the intervals specified in this manual. After each major illness or injury, as described in Section 5, an authorized scientific diver shall receive clearance to return to diving from a physician before resuming diving activities.

4.64 Emergency Care Training.

The scientific diver shall hold current training in the following:

1. Adult CPR
2. Emergency oxygen administration
3. First aid for diving accidents

4.70 REVOCATION OF AUTHORIZATION

A diving certificate may be revoked or restricted for cause by the DSO or the DCB. Violations of regulations set forth in this manual, or other governmental subdivisions not in conflict with this manual, may be considered cause. The DSO shall inform the diver in writing of the reason(s) for revocation. The diver will be given the opportunity to present their case in writing for reconsideration and/or reauthorization. All such written statements and requests, as identified in this section, are formal documents, which will become part of the diver's file. Following revocation, the diver may be reauthorized after complying with conditions the DCB may impose.

SECTION 5.00
Medical Standards

5.10 MEDICAL REQUIRMENTS

5.11 General Policy

A. The DCB shall determine that divers have passed a current diving physical examination and have been declared by the examining physician to be fit to engage in diving activities as may be limited or restricted in the medical evaluation report.

B. All medical evaluations required by this standard shall be performed by, or under the direction of, a licensed physician of the applicant-diver's choice, preferably one trained in diving/undersea medicine.

C. The diver should be free of any chronic disabling disease and be free of any conditions contained in the list of conditions (Section 5) for which restrictions from diving are generally recommended.

D. If the DSO is unsure whether or not the medical history of a diver is a contraindication to diver training then the diver should be sent to a physician for an evaluation as required by the training agency and this physician should have a general understanding of diving medicine. Even if approved by a general physician the diver may be required to complete further consultation/evaluation by a board-certified diving physician or a medical specialist with a general understanding of diving medicine if the DSO feels that diving is not in the individual's best interest or that their medical condition is likely to present a threat to others.

5.20 Frequency of Medical Evaluations

Medical evaluation shall be completed:		
Before Age 40	After age 40 Before Age 60	After Age 60
Before a diver may begin diving, unless an equivalent initial medical evaluation has been given within the preceding 5 years	Before a diver may begin diving, unless an equivalent initial medical evaluation has been given within the preceding 3 years	Before a diver may begin diving, unless an equivalent initial medical evaluation has been given within the preceding 2 years
At 5-year intervals	At 3-year intervals	At 2-year intervals
Clearance to return to diving must be obtained from a healthcare provider following a medically cleared diver experiencing any Conditions Which May Disqualify Candidates From Diving (Appendix 1), or following any major injury or illness, or any condition requiring chronic medication. If the condition is pressure related, the clearance to return to diving must come from a physician trained in diving medicine.		

5.30 Information Provided Examining Physician

The OM shall provide a copy of the medical evaluation requirements of this *Manual* to the examining physician. (Appendices 1, 2, and 3).

5.40 Content of Medical Evaluations

Medical examinations conducted initially and at the intervals specified in Section 5 shall consist of the following:

1. Diving physical examination (Appendix 2). Modifications or omissions of required tests are not permitted
2. Applicant agreement for release of medical information to the Diving Safety Officer and the DCB (Appendix 2b)
3. Medical history (Appendix 3)

5.50 Physician's Written Report

A. A Medical Evaluation of Fitness For Scuba Diving Report (or OM equivalent) signed by the examining physician stating the individual's fitness to dive, including any recommended restrictions or limitations will be submitted to the OM for the diver's record after the examination is completed.

B. The Medical Evaluation of Fitness For Scuba Diving Report will be reviewed by the DCB or designee 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. It is the diver's responsibility to provide to the OM 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 DCB or designee and the diver's record and authorizations will be updated accordingly.

VOLUME II

SECTION 6.00
Nitrox Diving

(This section describes the requirements for authorization and use of nitrox for Scientific Diving.)

6.10 REQUIRMENTS FOR NITROX AUTHORIZATION

Prior to authorization to use nitrox, the following minimum requirements shall be met:

6.11 Prerequisites

1. Only a certified Scientific Diver or DIT diving under the auspices of an OM is eligible for authorization to use nitrox.
2. Application for authorization to use nitrox shall be made to the DCB. Submission of documents and participation in aptitude examinations does not automatically result in authorization to use nitrox. The applicant shall convince the DCB through the DSO that they are sufficiently knowledgeable, skilled and proficient in the theory and use of nitrox for diving.

6.12 Training

In lieu of writing/promulgating AAUS specific training standards for Nitrox divers, AAUS references the standards for Nitrox diver training as defined by the WRSTC and/or ISO. AAUS programs who wish to train Nitrox divers may do so using one of the following options:

1. Under the auspices and standards of an internationally recognized diver training agency.
2. Under the auspices of AAUS using the minimum guidelines presented by the most current version of the RSTC/WRSTC and/or ISO Nitrox diver training standards.

References:

"Minimum Course Content for Enriched Air Nitrox Certification" - World Recreational Scuba Training Council (WRSTC), www.wrstc.com.

"Recreational diving services- Requirements for training programs on enriches air nitrox (EAN) diving". ISO 11107:2009 - International Organization for Standardization (ISO), www.iso.org

6.13 Practical Evaluation

1. Oxygen analysis of nitrox mixtures.
2. Determination of MOD, oxygen partial pressure exposure, and oxygen toxicity time limits, for various nitrox mixtures at various depths.
3. Determination of nitrogen-based dive limits status by EAD method using air dive tables, and/or using nitrox dive tables, as approved by the DCB.
4. Nitrox dive computer use may be included, as approved by the DCB.
5. A minimum of two supervised open water dives using nitrox is required for authorization.

6.14 Written Evaluation

1. Function, care, use, and maintenance of equipment cleaned for nitrox use.
2. Physical and physiological considerations of nitrox diving (e.g.: O_2 and CO_2 toxicity)
3. Diving regulations, procedures/operations, and dive planning as related to nitrox diving
4. Equipment marking and maintenance requirements
5. Dive table and/or dive computer usage
6. Calculation of: MOD, pO_2, and other aspects of Nitrox diving as required by the DCB

6.20 MINIMUM ACTIVITY TO MAINTAIN AUTHORIZATION

The diver should log at least one (1) nitrox dive in the past 12 months. If one nitrox dive has not been made in the past 12 months the diver should demonstrate O_2 analyzer use and review EANx procedures to the DSO or their designee. Failure to meet the minimum activity level may be cause for restriction or revocation of nitrox authorization.

6.30 OPERATIONAL REQUIRMENTS

6.31 Oxygen Exposure Limits

1. The inspired oxygen partial pressure experienced at depth should not exceed 1.6 ATA.
2. The maximum allowable exposure limit should be reduced in cases where cold or strenuous dive conditions, or extended exposure times are expected.

6.32 Calculation of Decompression Status

1. A set of DCB approved nitrox dive tables should be available at the dive site.
2. Dive computers may be used to compute decompression status during nitrox dives. Manufacturers' guidelines and operation instructions should be followed.
3. Dive computers capable of pO_2 limit and fO_2 adjustment should be checked by the diver prior to the start of each dive to ensure conformity with the mix being used.

6.33 Gas Mixture Requirements

1. Only nitrox mixtures and mixing methods approved by the DCB may be used.
2. OM personnel mixing nitrox shall be qualified and approved by the DCB for the method(s) used.
3. Oxygen used for mixing nitrox should meet the purity levels for "Medical Grade" (U.S.P.) or "Aviator Grade" standards.
4. In addition to the AAUS Air Purity Guidelines outlined in Section 3.60, any air that may come in contact with oxygen concentrations greater than 40% (i.e. during mixing), shall also have a hydrocarbon contaminant no greater than .01 mg/m^3.
    - For remote site operations using compressors not controlled by the OM where this is not verifiable, the DCB shall develop a protocol to mitigate risk to the diver.

6.34 Analysis Verification by User

1. Prior to the dive, it is the responsibility of each diver to analyze the oxygen content of their scuba cylinder and acknowledge in writing the following information for each cylinder: fO_2, MOD, cylinder pressure, date of analysis, and user's name.
2. Individual dive log reporting forms should report fO_2 of nitrox used, if different than 21%.

6.40 NITROX DIVING EQUITMENT

6.41 Required Equipment

All of the designated equipment and stated requirements regarding scuba equipment required in the *AAUS Manual* apply to nitrox operations. Additional minimal equipment necessary for nitrox diving operations includes:

1. Labeled SCUBA Cylinders in Accordance with Industry Standards
2. Oxygen Analyzers
3. Oxygen compatible equipment as applicable

6.42 Requirement for Oxygen Service

1. All equipment, which during the dive or cylinder filling process is exposed to concentrations greater than 40% oxygen, should be cleaned and maintained for oxygen service.
2. Any equipment used with oxygen or mixtures containing over 40% by volume oxygen shall be designed and maintained for oxygen service. Oxygen systems over 125 psig shall have slow-opening shut-off valves.

6.43 Compressor system

1. Compressor/filtration system shall produce oil-free air, or
2. An oil-lubricated compressor placed in service for a nitrox system should be checked for oil and hydrocarbon contamination at least quarterly.

SECTION 7.00
Other Diving Technology

Certain types of diving, some of which are listed below, require equipment or procedures, which require additional training. Supplementary guidelines may be available by the AAUS. UCSB divers using these technologies shall follow the guidelines approved by the DCB. Divers shall comply with all scuba diving procedures in this manual unless specified otherwise.

7.10 BLUE WATER DIVING

No diver shall plan or conduct blue water dives without prior approval of the DCB. Blue water diving is defined as diving in open water where the bottom is generally >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-CSGCP-014).

7.20 ICE AND POLAR DIVING

Divers planning to dive under ice or in polar conditions should use the following: “PESH-POL_2000.08 Standards for the Conduct of Scientific Diving”, National Science Foundation, Division of Polar Programs, 2015.

7.30 OVERHEAD ENVIRONMENTS

Overhead environments include water filled Caverns, Caves, Flooded Mines and Ice diving, as well as portions of Sunken Shipwrecks and other human-made structures. No diver shall plan or conduct dives within overhead environments without meeting current AAUS standards and prior approval of the DCB. Where an enclosed or confined space is not large enough for two divers, a diver shall be stationed at the underwater point of entry and an orientation line shall be used.

7.40 STAGED DECOMPRESSION DIVING

Decompression diving shall be 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. No diver shall plan or conduct staged decompression dives without meeting current AAUS standards and prior approval of the DCB.

7.50 HOOKAH

No diver shall plan or conduct hookah dives without prior approval of the DCB. At a minimum, any approved HOOKAH operations shall include:

A. Divers using the hookah mode shall be equipped with a diver-carried independent reserve breathing gas supply.

B. Each hookah diver shall be hose-tended by a separate dive team member while in the water.

C. The hookah breathing gas supply shall be sufficient to support all hookah divers in the water for the duration of the planned dive, including decompression.

7.60 SURFACE SUPPLIED DIVING

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. No diver shall plan or conduct surface supplied dives without prior approval of the DCB.

7.61 General Procedures for Surface Supplied Diving

A. Each diver shall be continuously tended while in the water.

B. A diver shall be stationed at the underwater point of entry when diving is conducted in enclosed or physically confined spaces.

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

D. For dives deeper than 100fsw (30 m) or outside the no-decompression limits:
   i. A separate dive team member shall tend each diver in the water;
   ii. A standby diver shall be available while a diver is in the water;

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 shall not be conducted at depths deeper than 190 fsw (57.9 m).

Additional Equipment & Manning Requirement will be determined by the DCB.

7.70 MIXED GAS DIVING

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. No diver shall plan or conduct mixed gas dives without meeting current AAUS standards and prior approval of the DCB.

7.80 DRYSUIT DIVING

All UCSB divers diving with drysuits under the auspices of UCSB shall demonstrate diving proficiency with a drysuit before diving in the ocean without direct supervision.

7.90 DIVE COMPUTERS

All UCSB divers using dive computers while diving under the auspices of UCSB shall be proficient with the use of their dive computer.

7.100 ALTITUDE DIVING

Divers planning to dive at sites with elevations greater than 2000ft shall have specialized and prior approval of the DCB.

7.110 OFFSHORE PLATFORM DIVING

Divers planning around or near an offshore platform structure shall have prior approval of the DCB. Offshore platform diving recommendations are available on UCSB's Dive Safety website.

7.120 CAVE AND CAVERN DIVING

No diver shall plan or conduct dives within a cave and/or cavern without meeting current AAUS standards prior approval of the DCB.

A dive team shall 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:

1. The absence of natural light.

2. Current or flow that vary in strength and direction. Of particular note is a condition known as siphoning. Siphoning caves have flow or current directed into the cave. This can cause poor visibility as a result of mud and silt being drawn into the cave entrance.
3. The presences of silt, sand, mud, clay, etc. that can cause visibility to be reduced to nothing in a very short time.
4. Restrictions –Any passage through which two divers cannot easily pass side by side while sharing air make air sharing difficult.
5. Cave-Ins –Cave-Ins, the collapse of a roof, wall, or ceiling, are a normal part of cave evolution; however experiencing a cave-in during diving operations is extremely unlikely

7.130 REBREATHERS

No diver shall plan or conduct dives within a rebreather without meeting current AAUS standards and prior approval of the DCB.

7.140 SATURATION DIVING

No diver shall plan or conduct saturation dives without meeting current AAUS standards and prior approval of the DCB.

7.150 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.

It is recognized that within scientific aquarium diving there are environments and equipment that fall outside the scope of those addressed in this Manual. In those circumstances it is the responsibility of the OM's DCB to establish the requirements and protocol under which diving will be safely conducted.

7.160 Skindiving and Freediving

University snorkeling and skindiving activities (<30ft) conducted in support of research do not fall under the oversight of the Dive Control Board, though the DSO may provide training and guidance for such activities as requested. The DCB does not recommend Freediving activities greater than 30 feet for university research due to the risks associated with breath-hold diving, and because SCUBA is generally the more practical and appropriate method for conducting research at those depths.

APPENDIX 1
DIVING MEDICAL EXAM OVERVIEW FOR THE EXAMINING PHYSICIAN

TO THE EXAMINING PHYSICIAN:

This person, _____, requires a medical examination to assess their fitness for authorization as a Scientific Diver for the____UC Santa Barbara__. Their answers on the Diving Medical History Form (attached) 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 UC Santa Barbara_ standards. Thank you for your assistance.

Eric Hessell	805 893-4559
Diving Safety Officer	**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: bracketed numbers are pages in Bove)

CONDITIONS WHICH MAY DISQUALIFY CANDIDATES FROM DIVING

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

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APPENDIX 2
AAUS/ MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING REPORT

_____

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

To The Examining 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 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 AAUS Medical Standards (Sec. 6.00). If you have questions about diving medicine, please consult with the Undersea Hyperbaric Medical Society or Divers Alert Network.

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 ontological 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[2]

PHYSICIAN'S STATEMENT:

_____ 01 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.

I have evaluated the abovementioned individual according to the American Academy of Underwater Sciences medical standards and required tests for scientific diving (Appendix 1) and, in my opinion, find no medical conditions that may be disqualifying for participation in scuba diving. I have discussed with the patient any medical condition(s) that would not disqualify him/her 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.

_____ _____
Signature Date

_____
Name (Print or Type)

My familiarity with applicant is: _____This exam only _____Regular physician for _____ years

My familiarity with diving medicine is: _____

APPENDIX 2b
AAUS/UCSB 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 _____UCSB_____ Diving Safety Officer and Diving Control Board or their designee at (place) _____ on (date) _____

Signature of Applicant _____
Date_____

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 3
DIVING MEDICAL HISTORY FORM

(To Be Completed By Applicant-Diver)

Name _____ Sex ____ Age ___ Wt.___ Ht. ___

Sponsor _____ Date ___/___/___
(Dept./Project/Program/School, etc.) (Mo/Day/Yr)

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 authorization procedure.

This form shall 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 shall 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	
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	

	Yes	No	Please indicate whether or not the following apply to you	Comments
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			Breathing difficulty after eating particular foods, after exposure to particular pollens or animals	
48			Are you subject to bronchitis	
49			Subcutaneous emphysema (air under the skin)	
50			Air embolism after diving	
51			Decompression sickness	
52			Rheumatic fever	
53			Scarlet fever	
54			Heart murmur	
55			Large heart	
56			High blood pressure	
57			Angina (heart pains or pressure in the chest)	
58			Heart attack	
59			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	

	Yes	No	Please indicate whether or not the following apply to you	Comments
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 4

AAUS REQUEST FOR DIVING RECIPROCITY FORM
VERIFICATION OF DIVER TRAINING AND EXPERIENCE

Diver:_____ Date:_____

This letter serves to verify that the above listed person 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 *(Organizational Member)* Diving Safety Manual, and has demonstrated competency in the indicated areas. (Organizational Member) is an AAUS OM and meets or exceeds all AAUS training requirements.

The following is a brief summary of this diver's personnel file regarding dive status at
_____
(Date)

_____ Original diving authorization
_____ Written scientific diving examination
_____ Last diving medical examination Medical examination expiration date_____
_____ Most recent checkout dive
_____ Scuba regulator/equipment service/test
_____ CPR training (Agency) _____ CPR Exp. _____
_____ Oxygen administration (Agency) _____ 02 Exp. _____
_____ First aid for diving _____ F.A. Exp. _____
_____ Date of last dive _____ Depth
Number of dives completed within previous 12 months?_____Depth Authorization_____ fsw
Total number of career dives? _____

Any restrictions? (Y/N)_____ if yes, explain:

Please indicate any pertinent specialty certifications or training:

Emergency Information:

Name: _____ Relationship: _____

Telephone: _____ (work)_____ (home) _____

Address: _____

This is to verify that the above individual is currently a certified scientific diver at _____

Diving Safety Officer:

_____ _____
(Signature) (Date)

_____ _____
(Print)

APPENDIX 5
DIVING EMERGENCY MANAGEMENT PROCEDURES

Introduction
A diving accident victim could be any person who has been breathing air underwater regardless of depth. It is essential that emergency procedures are pre-planned and that medical treatment is initiated as soon as possible. It is the responsibility of each AAUS organizational member to develop procedures for diving emergencies including evacuation and medical treatment for each dive location.

General Procedures
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. Stabilize the victim
3. Administer 100% oxygen, if appropriate (in cases of Decompression Illness, or Near Drowning).
4. Call local Emergency Medical System (EMS) for transport to nearest medical treatment facility. 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.
5. Call appropriate Diving Accident Coordinator for contact with diving physician and decompression chamber. etc.
6. Notify DSO or designee according to the Emergency Action Plan of the organizational member.
7. Complete and submit Incident Report Form to the DCB of the organization and the AAUS as required.

List of Emergency Contact Numbers Appropriate For Dive Location

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Available Procedures

- Emergency care
- Recompression
- Evacuation
-

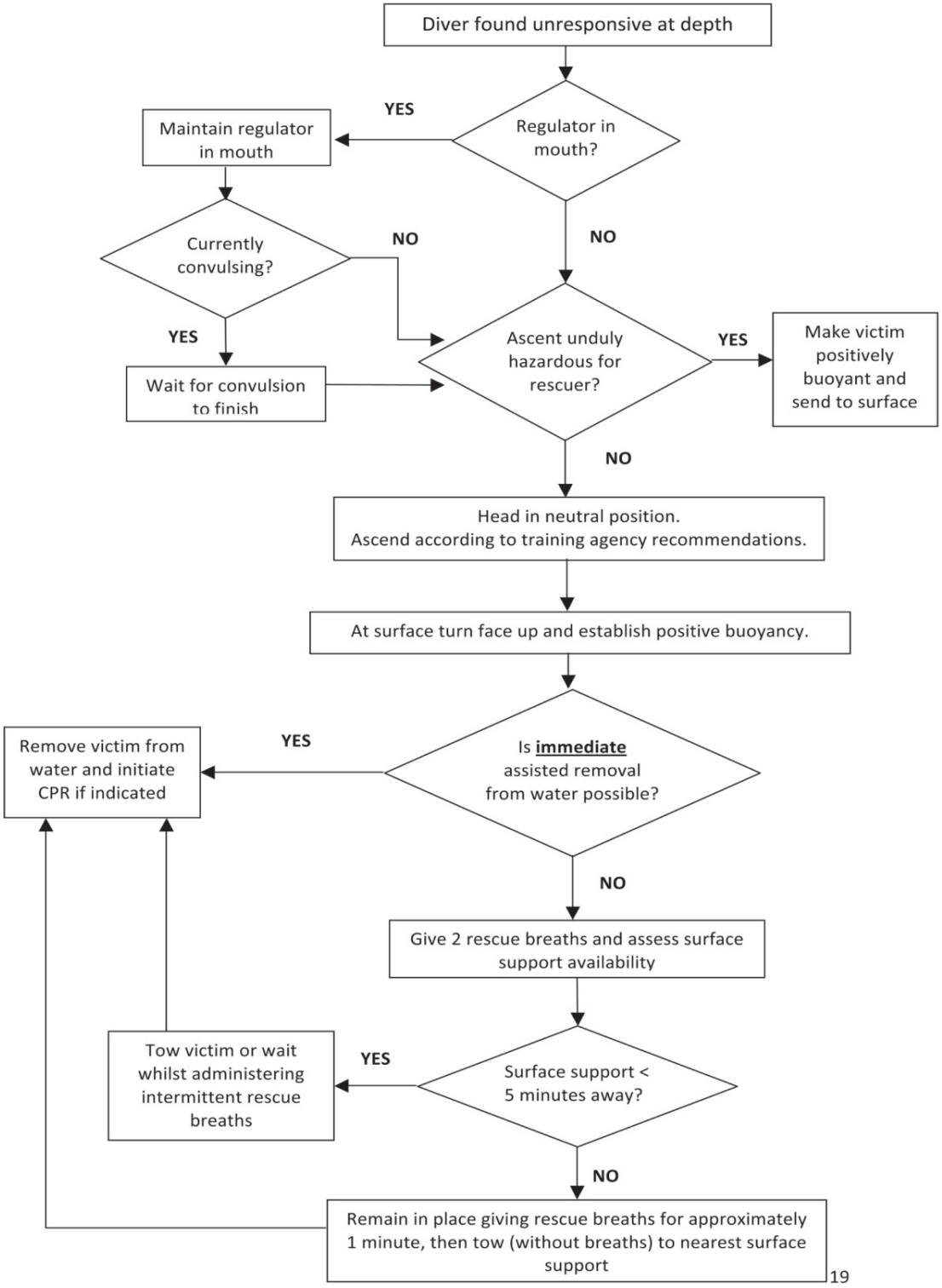
Emergency Plan Content

- Name, telephone number, and relationship of person to be contacted for each diver in the event of an emergency.
- Nearest operational decompression chamber.
- Nearest accessible hospital.
- Available means of transport.

Appendix 6

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



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Appendix 7
Auxiliary Equipment

The below outlined Auxiliary Equipment are examples of equipment and tools utilized by the scientific diver. These equipment and tools require theoretical and practical training and evaluation by the DSO or their designee on proper and safe use prior to being deployed by a scientific diver for underwater research purposes.

Sampling Equipment

Sampling Equipment is a broad category of equipment used to collect many types of data while underwater. These items include but are not limited to:

- Transect Tapes
- Quadrats
- Slates and other writing instruments
- Hand nets
- Sample Collection Storage
- Coring/Vibra-Coring
- Diver controlled suction dredges and air-lifts
- Traps

Pertinent Safety Considerations

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

Organism & Tissue Collection Tools - Spearguns & Pole Spears

Spearguns and pole spears can range in size and length. Each tool consists of a spear tip end for capturing organisms with a mechanism for projecting the spear, either by way of trigger (speargun) or a simple rubber sling (pole spear). These tools are constructed out of a wide variety of marine grade materials such as fiberglass, wood, plastics and steel.

Pertinent Safety Considerations

1. Slings and guns are not to be positioned in a tense, release mode unless the diver is actively targeting a specimen
2. Divers will only release/activate the pole spear/speargun in the opposite direction of their dive buddy.
3. Collection gear type should be appropriate for the targeted specimens to prevent any injuries. For example, if collecting lionfish, divers should use a collection container that is designed to hold the lionfish and prevent being stung by spines.

4. Collecting roving animals may cause a diver to inadvertently swim away from their dive buddy, or exceed maximum operating depths. Divers must regularly assess that they are at an appropriate depth and distance to reach or assist their dive buddy in the case of an emergency.
5. All effort must be taken to avoid damaging live benthic fauna (e.g., coral, sponges). Divers should position their spears to target the animal in the water column or release their spear when the targeted animal is near sand or bare rocks.
6. Collections should be spread out across numerous and vast areas, when possible, to avoid the aggregation of large predatory animals in one location.
7. In the case of aggressive large animals, dive buddies should position themselves close to one another and keep eyes on aggressive animals as they return to shore or other diving platform. If divers need to ascend to their boat, divers are to position themselves back-to-back so that aggressive animals can always be monitored by one of the divers. Use of the pole spear can be used to keep distance between the buddy team and the animal if they become too close.
8. Divers should be cautious of entrapment hazards when fish attempt to hide in reef areas.

Cameras - Still & Video

Cameras, diver carried and remote, are effective tools for the scientific diver in aiding with capture of natural phenomena, mechanical apparatus movement/behavior, archeological sites etc. The advancements in camera technology over the past decade(s) has made these tools compact and relatively inexpensive, allowing for most scientific diving operations to employ the benefits of these tools.

Pertinent Safety Considerations

1. Avoid perceptual narrowing when using a camera for scientific work and reinforce dive safety concerns during pre-dive briefings, i.e. decompression and gas management, buddy awareness, etc.
2. If utilizing a large camera, ensure proper buoyancy can be maintained throughout the planned scientific dive operations.
3. Cameras should have an attachment point on the diver that is easily accessed so that (1) camera can be maintained if the diver releases the camera and (2) can be removed efficiently in the event of an emergency.

Dive Lights

Lights designed for underwater use come in many different configurations, light output and size. Modern dive lights tend to have internal rechargeable batteries, variable lumen output and attachment points for easy installation of clips and/or lanyards for ease of stowage while conducting scientific diving operations. Uses range from night diving, cave/cavern diving, low visibility diving or deeper diving where true colors of objects must be examined.

Pertinent Safety Considerations

1. It is important to control the light whilst illuminated as to not temporarily blind yourself or others during a scientific dive operation.
2. Care should be taken when preparing battery compartments to ensure these areas cannot become flooded during a dive, i.e. presence of clean, lubricated o-ring(s). This could result in fire concern.
    a. Inspection of lights with rechargeable lithium batteries is also necessary to ensure the integrity of the light body is intact and will not flood.

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

Small Hand Tools

Small Hand Tools are any manually powered tool used for basic underwater tasks. Examples include, but are not limited to: screwdrivers, hammers, wrenches, pliers, prybars, hand saws, shears, clips, lines, zip ties etc.

Pertinent Safety Considerations

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

Handheld Underwater Power Tools

Handheld underwater power tools are battery, pneumatically or hydraulically powered tools that enhance the scientific diver's abilities to complete tasks efficiently. Small handheld drills, impact hammers & wrenches and grinders are examples of handheld underwater power tools available to the scientific diver.

Handheld underwater power tools are lightweight and assist the scientific diver in tasks such as creating holes in substrate, removing and collecting organisms or fixed items from benthic environments and establishing secure locations for scientific apparatus like sensors, automated sampling equipment or grids.

Pertinent Safety Considerations

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

Line Reels & Spools

Line reels and spools are designed to carry braided, nylon line on a drum and can be of varying sizes and line capacities. Reels tend to have a large capacity, have a guide for the line to aid the diver in paying out or loading the reel and are made of rugged materials specifically designed for underwater use. Spools are much simpler in design, are simply a drum of plastic, delrin or metal with braided and tend to carry less length of line than a reel. There are two general categories of use for line reels and spools: aid in navigation or searching and aid in surfacing when line is fixed to a surface marker.

Pertinent Safety Considerations

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

Delayed Surface Marker Buoy (dSMB)

Delayed Surface Marker Buoys vary in length and volume and are equipped with a means of (1) inflation while at depth (pneumatically or orally) and (2) venting gas to ensure the buoy does not experience rupture and lose buoyancy during ascent.

These types of buoys are generally used to indicate a diver or dive team's location during ascent in areas where operational hazards exist or challenging conditions are encountered, i.e. shipping/boating lanes, blue water ascents with currents. They also allow for points of reference during decompression, both recommended and mandatory stops.

They can also be utilized to mark locations of items at the bottom to ensure an efficient retrieval can be completed or the location can be revisited easily. Generally, dSMBs are not permanent installations but instead a short-term surface marker.

Pertinent Safety Considerations

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

Lift Bags

Lift bags are available in many configurations, lift capacity and constructed out of a myriad of materials. Listed below are common characteristics of lift bags used in scientific diving operations:

1. Commercially available.
2. Constructed from heavy duty materials that can withstand the stresses of raising objects underwater.
3. Most have exhaust valves for controlling variable volumes of gas experienced during lifting operations.
4. Constructed with loops, slings and other convenient locations for rigging and securing an object.

Lift bags are used to move items to the surface, laterally to new locations or to suspend apparatus mid-water, due to their size, weight and/or shape.

Additionally, lifting operations employing lift bags can be conducted with divers in the water and remotely, dependent upon operational needs and configurations. In all instances, divers are required to complete the rigging of the lift bags to the object.

Pertinent Safety Considerations

1. Select properly sized with appropriate lift capacity based on the object to be lifted, based on buoyancy needs of the object.
2. Select appropriate rigging materials based on the characteristics of the object, i.e. pre-stretched nylon rope and fastening knots for light loads; nylon straps, wire rope and/or chain with marine hardware for heavier loads.
3. Divers must be briefed on how to handle a lift that becomes uncontrolled, i.e. rapid ascent and descent.
4. Depth, water temperature, size of object and size/configuration of the lift bag along with complexity of the operation should all be factors to consider when determining if an independent gas source should be used for the lifting operation.
5. If divers are controlling the lift while in-water, attention must be paid to the volume of gas in the lift bag to ensure a controlled lift and/or avoid rapid descent due to loss of buoyancy of the object.

Full Face Masks

Full Face Masks are diving masks that have an integrated regulator. Full Face Masks (FFM) can allow for through water voice communication between divers and the surface, can decrease exposure in contaminated environments, can limit some cold-water exposure, and may be used to protect a diver's airway if they are prone to seizure or other medical compromises. While diving a FFM can provide advantages divers should be aware that FFM may also cause greater air consumption, can pose more complex procedures for out of air emergencies, and may be a little more difficult to equalize air spaces.

Pertinent Safety Considerations

1. Proper donning and adjusting
2. Closing any ambient breathing valves
3. Ensuring noseblocks and one-way valves are in place.
4. Checking seal, oronasal mask, and strap integrity
5. Appropriate bail out procedures
6. Carrying a spare scuba mask
7. Easy retrieval of spare regulator for bail out
8. Easy deployment of regulator to out of air diver
9. Proper de-watering procedures
10. Equalization techniques and procedures
11. Readability of gauges and computers
12. Gas consumption may increase with FFM diving
13. Gas block utilization/selector valve procedures (if applicable)
14. Proper through water comms procedures
15. Secondary communication protocols in case of loss of primary comms

Diver Propulsion Vehicles (DPV's)

A diver propulsion vehicle (DPV), also known as a scooter, is an item of diving equipment used by divers to increase range underwater. Range and/or Time limits are restricted by the amount of breathing gas that can be carried, the rate at which that breathing gas is consumed, the battery power/duration of the DPV and any potential decompression requirements. DPV's are available in different sizes and configurations.

Pertinent Safety Considerations

1. The DPV must not be used for ascents and descents.
2. DPV operation requires greater situational awareness to prevent buddy separation, maintain depth control, monitor breathing gas, and properly navigate.
3. Proper streamlining and equipment placement to prevent propeller entanglement.
4. If a DPV fails, floods or becomes unsafe to continue use, be prepared to leave it.
5. Regulator setup must allow for air sharing with a towed diver.
6. Observe an air rule that would allow you to swim back, towing DPV if necessary, from the most distant point of the dive
7. A diver shall only use those models of DPVs for which the diver has demonstrated proficiency, as described above.

APPENDIX 8

DEFINITION OF TERMS

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 DCB 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.

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.

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.

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 DCB 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.

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.

Diving Control Board (DCB) - Group of individuals who act as the official representative of the membership organization in matters concerning the scientific diving program (See Diving Control 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.

fO_2- 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.

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 $pO_2$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.

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.

pO_2- 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.

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.

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.

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.

APPENDIX 9
AAUS STATISTICS COLLECTION CRITERIA AND DEFINITIONS

COLLECTION CRITERIA:
The "Dive Time in Minutes", The Number of Dives Logged", and the "Number of Divers Logging Dives" will be collected for the following categories.

- Dive Classification
- Breathing Gas
- Diving Mode
- Decompression Planning and Calculation Method
- Depth Ranges
- Specialized Environments
- Incident Types

A. Dive Time in Minutes is defined as the surface-to-surface time including any safety or required decompression stops.
B. A Dive is defined as a descent underwater utilizing compressed gas and subsequent ascent/return to the surface with a minimum surface interval of 10 minutes.
C. Dives will not be differentiated as open water or confined water dives. But open water and confined water dives will be logged and submitted for AAUS statistics classified as either scientific or training/proficiency.
D. A "Diver Logging a Dive" is defined as a person who is diving under the auspices of your scientific diving organization. Dives logged by divers from another AAUS Organization will be reported with the diver's home organization. Only a diver who has actually logged a dive during the reporting period is counted under this category.
E. Incident(s) that occur during the collection cycle: Only incidents that occurred during, or resulting from, a dive where the diver is breathing a compressed gas will be submitted to AAUS.

DEFINITIONS:

Dive Classification:

- Scientific Dives: Dives that meet the scientific diving exemption as defined in 29 CFR 1910.402. Diving tasks traditionally associated with a specific scientific discipline are considered a scientific dive. Construction and trouble-shooting tasks traditionally associated with commercial diving are not considered a scientific dive.
- Training and Proficiency Dives: Dives performed as part of a scientific diver-training program, or dives performed in maintenance of a scientific diving certification/authorization.

Breathing Gas:

- Air: Dives where the bottom gas used for the dive is air.
- Nitrox: Dives where the bottom gas used for the dive is a combination of nitrogen and oxygen percentages different from those of air.
- Mixed Gas: Dives where the bottom gas used for the dive is a combination of oxygen, nitrogen, and helium (or other inert gas), or any other breathing gas combination not classified as air or nitrox.

Diving Mode:

- Open Circuit SCUBA: Dives where the breathing gas is inhaled from a self-contained underwater breathing apparatus and all of the exhaled gas leaves the breathing loop.
- 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 monitor the divers' depth, time and diving profile.
- 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.

- Rebreathers: Dives where the breathing gas is repeatedly recycled in a breathing loop. The breathing loop may be fully closed or semi-closed. Note: A rebreather dive ending in an open circuit bailout is still logged as a rebreather dive.

Decompression Planning and Calculation Method:
- Dive Tables
- Dive Computer
- Personal Computer (PC) Based Decompression Software

Depth Ranges:
Depth ranges for sorting logged dives are: 0-30, 31-60, 61-100, 101-130, 131-150, 151-190, 191-250, 251-300, and 301->. Depths are in feet seawater (when measured in meters: 0-10, >10-30, >30-40, >40-45, >45-58, >58-76, >76-92, and >92->). A dive is logged to the maximum depth reached during the dive. Note: Only "The Number of Dives Logged" and "The Number of Divers Logging Dives" will be collected for this category.

Specialized Environments:
- Required Decompression: Any dive where the diver exceeds the no-decompression limit of the decompression planning method being employed.
- Overhead Environments: Any dive where the diver does not have direct access to the surface due to a physical obstruction.
- Blue Water Diving: Openwater diving where the bottom is generally greater than 200 feet deep and requires the use of multiple-tethers diving techniques.
- Ice and Polar Diving: Any dive conducted under ice or in polar conditions. Note: An Ice Dive would also be classified as an Overhead Environment dive.
- Saturation Diving: Excursion dives conducted as part of a saturation mission are to be logged by "classification", "mode", "gas", etc. The "surface" for these excursions is defined as leaving and surfacing within the Habitat. Time spent within the Habitat or chamber must not be logged by AAUS.
- Aquarium: An aquarium is a shallow, 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 (Not a swimming pool).

Incident Types:
- Hyperbaric: Decompression Sickness, AGE, or other barotrauma requiring recompression therapy.
- Barotrauma: Barotrauma requiring medical attention from a physician or medical facility, but not requiring recompression therapy.
- Injury: Any non-barotrauma injury occurring during a dive that requires medical attention from a physician or medical facility.
- Illness: Any illness requiring medical attention that can be attributed to diving.
- Near Drowning/ Hypoxia: An incident where a person asphyxiates to the minimum point of unconsciousness during a dive involving a compressed gas. But the person recovers.
- Hyperoxia / Oxygen Toxicity: An incident that can be attributed to the diver being exposed to too high a partial pressure of oxygen.
- Hypercapnia: An incident that can be attributed to the diver being exposed to an excess of carbon dioxide.
- Fatality: Any death accruing during a dive or resulting from the diving exposure.
- Other: An incident that does not fit one of the listed incident types.

Incident Classification Rating Scale:
- Near-Miss: A near-miss is a potential hazard or incident in which no property was damaged and no personal injury was sustained, but where, given a slight shift in time or position, damage or injury easily could have occurred. Near misses also may be referred to as close calls, near accidents, or injury-free events.
- Minor: Injuries that the OM considers being minor in nature. Examples of this classification of incident would include, but not be limited to:
    - Mask squeeze that produced discoloration of the eyes.
    - Lacerations requiring medical attention but not involving moderate or severe bleeding.
    - Other injuries that would not be expected to produce long term adverse effects on the diver's health or diving status.

- Moderate: Injuries that the OM considers being moderate in nature. Examples of this classification would include, but not be limited to:
    - DCS symptoms that resolved with the administration of oxygen, hyperbaric treatment given as a precaution
    - DCS symptoms resolved with the first hyperbaric treatment
    - Broken bones
    - Torn ligaments or cartilage
    - Concussion
    - Ear barotrauma requiring surgical repair
- Serious: Injuries that the OM considers serious in nature. Examples of this classification would include, but not be limited to:
    - Arterial Gas Embolism
    - DCS symptoms requiring multiple hyperbaric treatment
    - Near drowning
    - Oxygen Toxicity
    - Hypercapnia
    - Spinal injuries
    - Heart attack
    - Fatality