



Connecticut Scuba Academy Inc
Scientific Diving Safety Manual

2021

Scientific Diving Program
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Forward

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 in the present day.

The policies, procedures, and standards outlined in this Diving Safety Manual are intended to govern the training and diving operations of all personnel participating in the Scientific Diving Program with Connecticut Scuba Academy (CTSA). It applies to all divers operating under CTSA Scientific diving auspices, including visiting divers and those responsible for administering the Science diving program.

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VOLUME 1

1 Sections 1.00 General Policy

1.1 Scientific Diving Standards

1.1.1 Purpose

The purposes of the Academy's diving safety standards is to ensure that all diving under the auspices of Connecticut Scuba Academy's (CTSA) Aquatic Science Diving program is conducted in a manner most likely to minimize accidental injury or occupational illness and to set forth rules, regulations, and standards for training and authorization which will allow working reciprocity between American Academy of Underwater Sciences (AAUS) member organizations.

1.1.2 Historical Perspective

This Manual was developed and written by Connecticut Scuba Academy (CTSA). The AAUS outline the NOAA dive manual sixth addition and compile the policies outlined in several universities' diving manuals and 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 scientific divers' health and safety since 1954. In 1982, OSHA exempted scientific diving from commercial diving regulations (29CFR1910, Subpart T) under certain conditions outlined below. The exemption's final guidelines became effective in 1985 (Federal Register, Vol. 50, No.6, p.1046). OSHA recognizes AAUS as the scientific diving standard-setting organization.

1.1.3 Diving safety manual

The purpose of this Diving Safety Manual is to set forth the basic underwater diving safety policy, organization, regulations, and procedures for CTSA's scientific diving operations and to meet OSHA's guidelines to exempt our scientific diving activities from commercial diving regulations (29CFR1910 Subpart T and 29CFR1910.401). As part of CTSA's annual report to AAUS, any recommendations for modifications of CSA's standards should be submitted to AAUS for consideration.

1.1.4 Science 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."

1.1.5 Scientific Diving Exemption

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

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

- 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.
- The purpose of the project using scientific diving is the advancement of science; therefore, information and data resulting from the project are non-proprietary.
- 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.
- 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.

1.2 Operational Control

1.2.1 Connecticut Scuba Academy (CTSA) Auspices Defined:

For these standards, the auspices of CTSA include any scientific diving operation in which CTSA is connected because of ownership of any life support equipment used, locations selected, or relationship with the individual(s) concerned. This includes all cases involving the operations of volunteers/employees of CTSA or employees of auxiliary organizations, where such volunteers/employees are acting within the scope of their employment, and the operations of other persons who are engaged in scientific diving with CTSA or are diving as members of an organization recognized by CTSA.

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

A. Training and Authorization

Any person diving under the CTSA Scientific dive program's auspices must observe this Manual's provisions. Individuals are not permitted to dive until they have met the diving requirements pertinent to the proposed activity level.

B. Equipment

All diving under CTSA scientific dive program's auspices shall be done with equipment, regardless of ownership, which conforms to the standards set in Section 3 of this Manual.

C. Diving Rules

The regulations herein shall be observed at all locations, whether owned by CTSA, where diving is carried out under CTSA scientific dive program auspices.

1.2.2 Authority and Responsibility

Full authority and operational responsibility for the scientific diving program's conduct with Connecticut Scuba Academy is vested in the Director. He/she is responsible for providing surveillance of diving activities, interpreting Academy policies, and developing additional policies, regulations, and standards consistent with Academy policies.

1. CTSA Board of Directors has the authority to suspend diving operations of programs that are considered unsafe.
2. The Board will assign a representative to act as liaison and meet with the DCB as an ex-officio member.

1.2.3 CTSA Scientific Diving Standards and Safety Manual

CTSA shall develop and maintain a scientific diving safety manual, which provides for the development and implementation of policies and procedures that will enable CTSA to meet requirements of local environments and conditions and comply with the AAUS

scientific diving standards. CTSA scientific diving standards shall include, but not be limited to:

- A. The AAUS Standards may be used as a set of minimum guidelines for developing the CTSA scientific diving safety manual.
- B. Emergency evacuation and medical treatment procedures.
- C. The criteria for diver training and authorization.
- D. Standards were written or adopted by reference for diving modes utilized, including the following:
 1. Safety procedures for the diving operation.
 2. Responsibilities of the dive team members.
 3. Equipment use and maintenance procedures.
 4. Emergency procedures.

1.2.4 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 his/her designee and include other diving program representatives. A chairperson and a secretary may be chosen from the membership of the board according to DCB procedure. A representative of BOD will be an ex-officio member.

B. Authority

The DCB shall have the autonomous authority over the CTSA Scientific Diving Program.

C. Responsibilities

The DCB is responsible for setting policy and shall:

1. Shall act as a board of appeal to consider diver-related problems.
2. Shall periodically review the DSO's performance and program.
3. Shall sit as a board of investigation to inquire into the nature and cause of diving accidents or CTSA diving manual violations.
4. Acting through the DSO, the DCB shall oversee the following:
 - Establish additional standards, protocols, and operational procedures beyond the AAUS minimums to address OM-specific needs and concerns.
 - Approve and monitor diving projects.
 - Review and revise the diving safety manual.
 - Ensure compliance with the diving safety manual.
 - Approve the depth to which a diver has been authorized to dive.
 - Take disciplinary action for unsafe practices.
 - Ensure adherence to the buddy system for scientific diving.
 - Act as the official representative of the OM in matters concerning the scientific diving program.
 - Act as a board of appeal to consider diver-related problems.
 - Recommend the issue, reissue, or revocation of diving authorizations.
 - Recommend changes in policy and amendments to AAUS and the OM's diving safety manual as the need arises.
 - Establish and/or approve training protocols or standards through which the applicants for authorization can satisfy the OM's diving safety manual's requirements.
 - Suspend diving operations considered to be unsafe or unwise.
 - Establish criteria for equipment selection and use.
 - Recommend new equipment or techniques.
 - Establish and/or approve facilities for the inspection and maintenance of diving and associated equipment.
 - Ensure that the OM's air station(s) meet air quality standards in this manual.

- Periodically review the DSO's performance and program.
- 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 diving program's safe conduct.

1.2.5 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 he/she 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 OM's scientific diving program.
2. If delegated by the DCB, this program's routine operational authority 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. However, the DSO will retain operational responsibility for the conduct of the scientific diving program.
5. Shall suspend diving operations determined to be unsafe or unwise.

1.2.6 Instructional Personnel

A. Qualifications

All personnel involved in diving instruction under the auspices of CTSA shall be qualified for the type of instruction being given.

B. Selection

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

1.2.7 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 another organizational member's auspices by submitting to the Diving Safety Officer of the host organizational member a document containing all the information described in Appendix 2, approved by the DSO or Chairperson of the home DCB.
- C. A visiting scientific diver may be asked to demonstrate his/her 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.

1.2.8 Waiver of Requirements

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

1.3 CONSEQUENCES OF VIOLATION OF REGULATIONS BY SCIENTIFIC DIVERS

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

1.4 CONSEQUENCES OF VIOLATION OF REGULATIONS BY Connecticut Scuba Academy

Failure to comply with the regulations of this Manual may be cause for the restriction or revocation of the CTSA recognition by AAUS

SECTION 2.00 DIVING REGULATIONS

1.5 Introduction

No person shall engage in scientific diving operations under the auspices of CTSA scientific diving program unless he/she holds a current authorization issued under the provisions of this manual.

1.6 Pre-Dive Procedures

1.6.1 Dive Plan

Dives should be planned around the competency of the least experienced diver. Before conducting any diving operations under the auspices of CTSA, the lead diver/dive supervisor for a proposed operation shall have the general dive plan approved by the DSO. The dive plan form is available on CTSA's website.

- A. The dive plan should include the following:
 - 1. Diving Mode(s) and Gas(es)
 - 2. Divers' authorizations
 - 3. Approximate number of proposed dives
 - 4. Location(s) of proposed dives
 - 5. Estimated depth(s) and bottom time(s) anticipated
 - 6. Decompression status and repetitive dive plans, if required
 - 7. Proposed work, equipment, and boats to be employed
 - 8. Any hazardous conditions anticipated
 - 9. Emergency Action Plan
 - 10. In water details of the dive plan should include:
 - a) Dive Buddy assignments and tasks
 - b) Goals and objectives
 - c) Maximum depth(s) and bottom time
 - d) Gas management plan
 - e) Entry, exit, descent and ascent procedures
 - f) Perceived environmental and operational hazards and mitigations
 - g) Emergency and diver recall procedures

1.6.2 Diver Responsibility and Refusal to Dive

- a) The decision to dive is that of the diver. The ultimate responsibility for safety rests with the individual diver.
- b) It is the diver's responsibility and duty to refuse to dive, without fear of penalty, if in his/her judgment, conditions are unsafe or unfavorable, or if he/she would be violating the precepts of regulations in this Manual.
- c) No dive team member will be required to be exposed to hyperbaric conditions against his/her will.

- d) 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.

1.6.3 Pre-Dive Safety check

- a) Before commencing the dive, the team must ensure that every team member is healthy, fit, and trained for the type of dive attempted.
- b) Scientific divers must conduct a functional check of their diving equipment in the dive buddy or tender presence. They must ensure the equipment is functioning correctly and suitable for the type of diving operation being conducted.
- c) Each diver must have the capability of achieving and maintaining positive buoyancy at the surface.
- d) Environmental conditions at the site will be evaluated before entering the water.

1.7 Diving Procedures

1.7.1 Lead Diver/Dive Supervisor

For each dive, one individual shall be designated as the lead diver. This person shall be at the dive location during the entire diving operation. The lead diver 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 lead diver shall suspend diving operations if conditions are not safe, in his/her opinion.
- b) Briefing
The dive team members shall be briefed on:
 - 1. Dive Buddy assignments and tasks
 - 2. Dive objectives.
 - 3. Maximum depth(s) and bottom time
 - 4. Gas management plan
 - 5. Entry, exit, descent and ascent procedures
 - 6. Perceived environmental and operational hazards and mitigations
 - 7. Emergency and diver recall procedures.
- c) Dive Planning
Planning of a diving operation shall be in accordance with this manual and include the following considerations of the divers' safety and health aspects.
 - 1. Diving mode
 - 2. Surface and underwater conditions and hazards
 - 3. Breathing gas supply
 - 4. Thermal protection
 - 5. Diving equipment
 - 6. Qualifications of all dive team members for the type of diving operations
 - 7. Residual inert gas status of dive team members

8. Decompression schedules and altitude corrections

9. Emergency procedures.

d) Emergency Equipment.

The lead diver shall ensure that emergency equipment is present.

1.7.2 Solo Diving Prohibition

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

1.7.3 Termination of the Dive

- a) It is the diver's responsibility to terminate the dive, without fear of penalty, whenever they feel it is unsafe to continue the dive unless it compromises the safety of another diver already in the water.
- b) The dive shall 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.

1.7.4 Refusal to Dive

- a) The decision to dive is that of the diver. A diver may refuse to dive, without fear of penalty, whenever he/she feels it is unsafe for them to make the dive.
- b) The ultimate responsibility for safety rests with the individual diver. It is the diver's responsibility and duty to refuse to dive if in their judgment, conditions are unsafe or unfavorable, or if he/she would be violating the precepts of his/her training or the regulations in this manual.

1.7.5 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, which is likely to cause death, serious physical harm, or major environmental damage. A written report of such actions shall be submitted to the DCB explaining the circumstances and justifications.

1.7.6 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.

1.7.7 Dive Flags

Local regulations are to be adhered to regarding dive flags. A dive flag shall be displayed prominently over the dive site whenever diving is conducted.

Connecticut:

- Dive flag must be two-sided and at least 13" x 15"
- No more than 4 divers per flag (unless displayed on a boat, then maximum is determined by boat capacity)
- Divers must not surface or swim more than 50' from their flag

- Boaters must stay at least 100' away from dive flags

Maine:

- Dive flag must be displayed on recreational vessels if engaged in scuba diving activities

Massachusetts:

- Dive flag must be at least 12" x 15" and red in color with a white diagonal line
- Must extend at least 3' above the water surface
- Divers must not surface or swim more than 100' from their flag
- Boaters shall not exceed 3mph in the presence of a dive flag

New Hampshire:

- Red and white diver down flag must be used at all times during diving activities
- Bottom of flag must extend at least 3' above the water surface
- Divers must not surface or swim more than 75' from their flag
- Boaters must remain a minimum of 150' away from dive flags and maintain headway speed

Rhode Island:

- Dive flag must be at least 12" x 12" and red in color with a white diagonal line
- If flown from a boat, the flag must be at least 18" x 18"
- Boaters must stay at least 50' from dive flags unless they are obstructing navigation
- Flag must be illuminated at night

Vermont:

- Dive flag must be at least 12" x 12" and red in color with a white diagonal line
- Boaters must stay at least 200' from dive flags

New York

- Divers must use a red and white Diver Down flag.
- Dive flags must be at least 12"x12"
- Divers are required to stay within 100 feet of the flag when surfacing.
- Boaters are required to stay at least 100 feet from all dive flags.

1.7.8 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 the CTSA. On any given dive, both divers in the buddy pair shall follow the most conservative dive profile.

1.7.9 Depth Limits

- A. Each scientific diver shall be authorized to a specific depth limit by the DSO.
- B. Each scientific diver diving under the auspices of the CTSA shall not exceed his/her depth authorization unless accompanied by a diver certified to a greater depth. Under these circumstances, the diver may not exceed his/her depth limit by more than one step.

1.8 POST-DIVE PROCEDURES

1.8.1 Post-Dive Safety Checks

After the completion of a dive, each diver must report any physical problems, symptoms of decompression sickness, or equipment malfunctions to the Lead Diver, DSO, and/or DCB.

1.8.2 Equipment

After diving operation is completed all equipment is to be cleaned and stored according to dive leader/supervisor directions

1.8.3 Logs

All dive logs and sign offs should be completed as soon as possible

1.9 FLYING AFTER DIVING or ASCENDING TO ALTITUDE (Over 2200 feet)

- A. Following a Single No-Decompression Dive: Divers should have a minimum preflight surface interval of 24 hours
- B. Following Multiple Dives per Day or Multiple Days of Diving: Divers should have a minimum preflight surface interval of 24 hours.
- C. Following Dives Requiring Decompression Stops: Divers should have a minimum preflight surface interval of 24 hours.
- D. Before ascending to Altitude (above 2200 feet) by land transport: Divers should follow the appropriate guideline for preflight surface intervals unless the decompression procedure used has accounted for the increase in elevation.

1.10 RECORDKEEPING AND REQUIREMENTS

1.10.1 Logging Dives

Each certified scientific diver shall log every dive made under the CTSA scientific dive program's auspices and is encouraged to log all other dives. Dives should be logged at least monthly. Details of the submission procedures are left to the discretion of the DSO. The diving log shall be in a form specified by the Diving Safety Office and shall include at least the following:

- A. Name of diver, buddy, and Lead Diver.
- B. Date, time, and location.
- C. Diving modes used.
- D. General nature of diving activities.
- E. Approximate surface and underwater conditions.
- F. Maximum depths, bottom time, and surface interval time.
- G. Diving table or computer used.
- H. Detailed report of any near or actual incidents.

1.10.2 Record Maintenance

It is the responsibility of the individual diver to maintain his/her active scientific diver status. The DSO or his/her designee shall maintain permanent records for each scientific diver certified. The file shall include evidence of certifications, dive logs, current physical examination results, waivers, reports of disciplinary actions by the DCB, and other pertinent information deemed necessary.

1.10.3 Required Incident Reporting

All diving incidents requiring recompression treatment or resulting in moderate or severe injury or death shall be reported to the CTSA DCB. CTSA's regular procedures for incident reporting, including those required by the AAUS, shall be followed. The report will specify the circumstances of the incident and the extent of any injuries or illnesses. Additional information shall meet the following reporting requirements:

- A. CTSA shall record and report occupational injuries and illnesses per requirements of the appropriate Labor Code section.
- B. If pressure-related injuries are suspected, or if symptoms are evident, the following additional information shall be recorded and retained by CTSA, with the record of the dive, for five years, and a written descriptive report should include:
 - Complete AAUS Incident Report.
 - Summary of experience of divers involved.
 - 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.
- C. The DCB shall investigate and document any incident of pressure-related injury and prepare a report to be forwarded to the AAUS during the annual reporting cycle. This report shall first be reviewed and released by the CTSA DCB and contain at a minimum:

2 SECTION 3.00 DIVING EQUIPMENT

2.1 GENERAL POLICY

- A. All equipment shall meet standards as determined by the DSO and the DCB. Equipment that is subjected to extreme usage under adverse conditions should require more frequent testing and maintenance.
- B. It is the primary user's responsibility (the diver) to regularly examine their equipment and verify that it is fit for use before each dive.

2.2 EQUIPMENT

2.2.1 Regulators and Gauges

- A. The diver shall inspect Scuba regulators and gauges before each use. Regulators and gauges should be functionally inspected/tested at intervals not to exceed 12 months. The regulator's first

and second stages should also be serviced at a minimum every two years or per manufacturer's recommendations.

B. Standard open circuit (OC) regulator configuration is:

1. A first stage
2. Primary 2nd stage
3. Back up 2nd stage
4. Submersible Pressure Gauge (SPG)
5. Inflator hose for a Buoyancy Compensator Device

C. A Full-Face Mask may be used in place of the primary 2nd stage according to the manufacturer's recommendations

2.2.2 Equipment for Determination of Decompression Status

A. Each buddy team member shall have an underwater timing device and depth indicator or dive computer.

B. If dive tables are being used, a set shall be available at the dive location.

C. If a dive computer is used, the diver shall use the same computer used on repetitive dives.

D. Ascent should be initiated when the no-deco time displayed at depth is no less than 10 minutes (5 min at depths 100 ft or greater) without prior approval from the DSO.

E. In an aquarium or other artificial structure of a known maximum obtainable depth:

1. A depth indicator is not required, except when a diver's decompression status shall be taken into consideration on repetitive dives .
2. Only one buddy shall be equipped with a timing device.
3. The maximum obtainable depth of the aquarium shall be used as the diving depth.

2.2.3 Scuba Cylinders

A. Scuba cylinders shall be designed, constructed, and maintained following the Unfired Pressure Vessel Safety Orders' applicable provisions.

B. Scuba cylinders shall be hydrostatically tested following DOT standards.

C. Scuba cylinders shall have an internal inspection at intervals not to exceed 12 months.

D. Scuba cylinder valves shall be functionally tested at intervals not to exceed 12 months.

2.2.4 Buoyancy Compensation Devices (BCD)s

A. Each diver shall have the capability of achieving and maintaining neutral buoyancy underwater and positive buoyancy at the surface.

B. BCDs, drysuits, or other variable volume buoyancy compensation devices shall be equipped with an exhaust valve.

C. These devices shall be functionally inspected and tested at intervals not to exceed 12 months.

D. BCDs, drysuits, or other variable volume buoyancy compensation devices shall not be used as lifting a device instead of lift bags.

2.2.5 Handheld underwater power tools

Electrical tools and equipment used underwater shall be specifically approved for this purpose. Electrical tools and equipment supplied with power from the surface shall be de-energized before being placed into or retrieved from the water. Hand-held power tools shall not be supplied with power to the dive location until requested by the diver.

2.2.6 First aid supplies

First aid kit and emergency oxygen appropriate for the diving being conducted shall be available.

2.2.7 Dive Flag

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

2.2.8 Compressor Systems - CTSA Controlled

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

- A. Volume tanks used in conjunction with a low-pressure compressor to supply air to the diver shall have a check valve on the inlet side, a relief valve, and a drain valve
- B. Compressed air systems over 500 psig shall have slow-opening shut-off valves.
- C. All air compressor intakes shall be located away from areas containing exhaust or other contaminants.

2.3 EQUIPMENT MAINTENANCE

2.3.1 Recordkeeping

Each equipment modification, repair, test, calibration, or maintenance service must be logged, including the date and nature of work performed, the 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

2.3.2 Compressor Operation 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.

2.4 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)

Commonly Used Air Specifications for Diving

LIMITING CHARACTERISTICS	CGA, Grade E (1997)	NITROX		
		ANDI ('94)	IANTD ('98)	UBS ('97)
Percent O ₂ Balance Predominantly N ₂	atm/ 20-22 ⁽²⁾	atm / 20-22	atm/ 20-22	atm/ 20-40
Water, ppm (v/v) ⁽³⁾	⁽³⁾	128		63
Dew Point, °F ⁽³⁾	⁽³⁾	-40°		-50°
Condensed Hydrocarbons & Particulates, mg/m ³ at NTP	5 ⁽⁴⁾	.1	.1	5
Carbon Monoxide, ppm	10	2	2	10
Odor ⁽⁶⁾	⁽⁶⁾	⁽⁶⁾	⁽⁶⁾	⁽⁶⁾
Carbon Dioxide, ppm	1000	500	1000	1000
Total Hydrocarbon Content (as methane), ppm	25	25	25	25
Solid Particles, >2µm diameter		None		
Halogenated Solvents, ppm				
Nitrogen dioxide, ppm				
Nitrous oxide, ppm				
Sulfur dioxide, ppm				
Sampling Frequency	Per agreement <small>(Between Vendor/Supplier)</small>	Quarterly	Not stated	Quarterly
Laboratory Analysis/ Accredited Laboratory	Supplier or Lab Not Req.	Recommended	Not stated	Recommended

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 must develop a protocol to mitigate risk to the diver.

3 SECTION 4.00 SCIENTIFIC DIVER CERTIFICATION AND AUTHORIZATIONS

3.1 GENERAL POLICY

Set forth below are the training requirements for CTSA Scientific Diver authorization. No person shall engage in scientific diving activities under the auspices of CTSA until the DSO, acting on behalf of the DCB, has issued a Scientific Diving Authorization and approved a submitted CTSA Dive Plan. Submission of documents and participation in aptitude examinations does not automatically result in authorization. The applicant shall convince the DSO that he/she is sufficiently skilled and proficient to be authorized by the DCB. Any applicant who does not possess the necessary judgment, under diving conditions, for the diver's safety and his/her partner may be denied CTSA Scientific Diver privileges.

3.2 PREREQUISITES

3.2.1 Eligibility

- a) Only persons diving under CTSA auspices are eligible for CTSA Scientific Diver training and authorization. Generally, these people will be affiliated with CTSA; 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 sixteen years of age have at least entry-level SCUBA training from an internationally recognized agency and at a minimum of 20 logged dives since the entry-level training was completed.

3.2.2 Application

Application for authorization should be submitted to the DSO, and the application form is available at www.ctscuba.org.

3.2.3 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.

3.2.4 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, the candidate shall be appropriately weighted to provide for neutral buoyancy where exposure protection is needed.

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 12 minutes without swim aids and for 2 of those minutes without hands.
4. Demonstrate swimming with snorkel and fins with and without facemask.
5. Surface dive without fins to a depth of 10-15 feet and recover a 10 lb weight.
6. Transport a passive person of equal size a distance of 25 yards (23 meters) in the water.

3.3 TRAINING

The candidate must complete prerequisites, theoretical aspects, practical training, and examinations for a minimum cumulative time of 100 hours and a minimum of 16 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 CTSA training course, formalized training, and 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 the specific overlap between on-the-job training, previous scientific diving training/experience, and course requirements and determine how potential deficiencies will be resolved. However, OMs cannot "test-out" divers, regardless of experience, when they have no previous scientific diving experience. 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 his/her buddy may be denied OM scientific diving privileges.

Theoretical Training / Knowledge Development	
Required Topics:	Suggested Topics:
Diving Emergency Care Training <ul style="list-style-type: none">• Cardiopulmonary Resuscitation (CPR)• AED• Standard or Basic First Aid• Recognition of DCS and AGE• Accident Management• Field Neurological Exam• Oxygen Administration	Specific Dive Modes (methods of gas delivery) <ul style="list-style-type: none">• Open Circuit• Hookah• Surface Supplied diving• Rebreathers (closed and/or semi-closed)
Dive Rescue <ul style="list-style-type: none">• To include procedures relevant to OM specific protocols. (See water skills below)	Specialized Breathing Gas <ul style="list-style-type: none">• Nitrox• Mixed Gas

Scientific Method	Small Boat Operation
Data Gathering Techniques (Only items specific to area of study required) <ul style="list-style-type: none"> • 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 	Specialized Environments and Conditions <ul style="list-style-type: none"> • 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
Required Topics:	Suggested Topics:
Navigation	HazMat Training <ul style="list-style-type: none"> • Chemical Hygiene, Laboratory Safety (Use of Chemicals)
HazMat Training <ul style="list-style-type: none"> • HP Cylinders 	
Decompression Management Tools <ul style="list-style-type: none"> • Dive Tables • Dive Computers • PC Based Software 	Specialized Diving Equipment <ul style="list-style-type: none"> • Full face mask • Dry Suit • Communications • Dive Propulsion Vehicle (DPV) • SMBs/Lift Bags • Line Reels
AAUS Scientific Diving Regulations and History <ul style="list-style-type: none"> • Scientific Dive Planning • Coordination with other Agencies • Appropriate Governmental Regulations 	
Hazards of breath-hold diving and ascents	
Dive Physics (Beyond entry level scuba)	
Dive Physiology (Beyond entry level scuba)	Other Topics and Techniques as Determined by the DCB
Dive Environments	
Decompression Theory and its Application	

Practical Training / Skill Development	
Confined Water	At the completion of training, the trainee must satisfy the DSO or DCB-approved designee of their ability to perform the following, as a minimum, in a pool or in sheltered water: <ul style="list-style-type: none"> • 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

	<p>recipient, with and without a face mask</p> <ul style="list-style-type: none"> • 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
Open Water Skills	<p>The trainee must satisfy the DSO, or DCB-approved designee, of their ability to perform at least the following in open water:</p> <ul style="list-style-type: none"> • 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* ^^ <p>Rescue Skills:</p> <ul style="list-style-type: none"> • 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 9 <p>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</p> <p>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 must proceed shallower to deeper after acceptable skills and judgement have been demonstrated, and are not to exceed 100 feet (30 m) during the initial 12 dive cycle</p> <p>* Checkout dive element</p> <p>^^ Evaluated on all dives</p> <p>^ Evaluated at some point during the training cycle</p>

Examinations

Equipment	<p>The trainee will be subject to examination/review of:</p> <ul style="list-style-type: none"> • Personal diving equipment • Task specific equipment • Function and manipulation of decompression computer to be employed by the diver (if applicable)
Written Exams	<p>The trainee must pass a written examination reviewed and approved by the OM DCB that demonstrates knowledge of at least the following:</p> <ul style="list-style-type: none"> • 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)

3.4 TYPES OF AUTHORIZATION

Only a person diving under CTSA auspices is eligible for Scientific Diver authorization from the Connecticut Scuba Academy, Cheshire CT.

3.4.1 Scientific Diver-in-Training Authorization

This permit signifies the diver has completed an internationally recognized recreational diving course and has met the requirements and has been approved by the DSO to participate in the training.

3.4.2 Scientific Diver Authorization

This is a permit to dive, issued by the DSO upon recommendation of the DCB, usable only while it is current and for the purpose intended.

3.4.3 Temporary Diver Authorization

This authorization is issued only following a demonstration of the required proficiency in diving and if the person in question can contribute measurably to a planned dive. It is granted by the DSO and is valid only for a specified time. Temporary diver authorizations shall be restricted to the planned diving operation under CTSA auspices shall comply with all other policies, regulations, and standards of this manual, including medical requirements.

3.4.4 Scientific Diving Reciprocity Authorization

The DSO issues this authorization to an authorized Scientific Diver from an organization that operates, at a minimum, under scientific diving regulations that meet or exceed AAUS scientific diving regulations. The visiting diver shall, at a minimum, adhere to CTSA Manual for Diving Safety. Before arrival, a Scientific Diving Reciprocity form signed by the DSO or Chairman of the home organization's DCB shall be submitted to the CSA's DSO for approval. The visiting diver may be asked to demonstrate their knowledge and skills for the planned dive.

3.4.5 Denial of Authorization

Submission of documents and participation in aptitude examinations does not automatically result in authorization. The applicant shall convince the DSO and members of the DCB that they are sufficiently skilled and proficient to be certified. Any applicant, who does not possess the necessary judgment for the diver's safety and partner, may be denied CTSA scientific diving privileges.

3.5 WAIVER OF REQUIREMENTS

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

3.6 DEPTH AUTHORIZATIONS AND PROGRESSION

The CTSA Scientific Diver authorization will authorize the holder to dive to the depth indicated in his/her records. A diver shall not exceed his/her depth authorization, unless accompanied by a diver certified to a greater depth. Under these circumstances, the diver may not exceed his/her depth limit by more than one step.

3.6.1 Authorization to 30 Foot Depth

This is the initial authorization, approved upon successful completion of training listed in Section 4. Cumulative minimum supervised dives: 12.

3.6.2 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.

3.6.3 Authorization to 100- and 130-Foot Depth

A diver holding a 60 foot authorization may be certified to depths of 100 and 130 feet, respectively, by logging a minimum of 6 scientific dives near the maximum planned depth. The diver shall also demonstrate proficiency in the use of dive tables and computers. Cumulative minimum supervised dives: 30.

3.6.4 Authorization to 150 and 190 Foot Depth

A diver may be certified to depths of 150 and 190 feet, respectively, provided there is a scientific need, by logging 6 dives within each depth authorization range. The diver shall also demonstrate knowledge of the special problems of deep diving, and of special safety requirements. Cumulative minimum supervised dives: 42.

3.6.5 Authorization deeper than 190 Foot Depth or greater

Authorization to Depths over 190 feet shall be authorized by the DCB and meet current AAUS Standards.

3.6.6 Diving on air is not permitted beyond a depth of 190 feet.

Dives beyond 190 feet require the use of mixed gas.

3.7 CONTINUATION OF SCIENTIFIC DIVER AUTHORIZATION

3.7.1 Minimum Activity to Maintain Authorization

During any 12 months, each certified scientific diver shall log a minimum of 16 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 months. 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.

3.7.2 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 CSA's DCB.

3.7.3 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.

3.7.4 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

3.8 REVOCATION OF AUTHORIZATION

A diving certificate may be revoked or restricted for cause by the DSO or the DCB. Violations of regulations outlined 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 allowed to present his/her case in writing for reconsideration and/or reauthorization. As identified in this section, all such written statements and requests 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.

4 SECTION 5.00 MEDICAL STANDARDS

4.1 MEDICAL REQUIRMENTS

4.1.1 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 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.

4.2 Frequency of Medical Evaluations

<i>Medical evaluation must be completed:</i>		
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.		

4.3 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).

4.4 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.

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5 SECTION 6.00 NITROX DIVING

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

5.1 REQUIRMENTS FOR NITROX AUTHORIZATION

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

5.1.1 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 the 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.

5.1.2 Training

In lieu of writing/promulgating AAUS specific training standards for Nitrox divers, AAUS references Nitrox diver training standards 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:

- a) Under the auspices and standards of an internationally recognized diver training agency.
- b) 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

5.1.3 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.

5.1.4 Written Evaluation

1. Function, care, use, and maintenance of equipment cleaned for nitrox use.
2. Physical and physiological considerations of nitrox diving (eg.: O₂ and CO₂ 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, pO₂, and other aspects of Nitrox diving as required by the DCB

5.2 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 O₂ analyzer use and review EANx procedures to the DSO or his/her designee. Failure to meet the minimum activity level may be cause for restriction or revocation of nitrox authorization.

5.3 Operational Requirements

5.3.1 Oxygen Exposure Limits

1. The inspired oxygen partial pressure experienced at depth should not exceed 1.5 ATA.
2. The maximum allowable exposure limit should be reduced in cases where cold or strenuous dive conditions or extended exposure times are expected.

5.3.2 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 pO₂ limit and fO₂ adjustment should be checked by the diver before each dive's start to ensure conformity with the mix being used.

5.3.3 Gas Mixture Requirements

1. Only nitrox mixtures and mixing methods approved by the DCB may be used.
2. CTSA 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/m³.
5. For remote site operations using compressors not controlled by the CTSA where this is not verifiable, the DCB shall develop a protocol to mitigate risk to the diver.

5.3.4 Analysis Verification by User

1. Prior to the dive, it is the responsibility of each diver to analyze the oxygen content of his/her scuba cylinder and acknowledge in writing the following information for each cylinder: fO₂, MOD, cylinder pressure, date of analysis, and user's name.
2. Individual dive log reporting forms should report fO₂ of nitrox used, if different than 21%.

5.4 NITROX DIVING EQUIPMENT

5.4.1 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 per Industry Standards
2. Oxygen Analyzers
3. Oxygen compatible equipment as applicable

5.4.2 Requirement for Oxygen Service

1. All equipment, which is exposed to concentrations greater than 40% oxygen during the dive or cylinder filling process, 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.

5.4.3 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.

6 SECTION 7.00 Surface Supplied Diving Technologies

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

6.1 Prerequisites

All surface supplied and hookah divers must be certified scientific divers or divers in training and have completed system specific training as authorized by the OM.

6.2 Surface Supplied Diving

Surface Supply Definition

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, pneumotachometer hose, and communication line. The umbilical supplies a helmet or full-face mask, often with voice communications.

6.2.1 Procedures

- a) Each diver must be continuously tended while in the water.
- b) A diver must be stationed at the underwater point of entry when diving is conducted in enclosed or physically confined spaces.
- c) Each diving operation must have a primary breathing gas supply sufficient to support divers for the planned dive duration, including decompression.
- d) For dives deeper than 100 feet (30 m) or outside the no-decompression limits:
 - A separate dive team member must tend each diver in the water;
 - A standby diver must be available while a diver is in the water
- e) A diver using Surface Supply may rely on surface personnel to keep the diver's depth, time and diving profile
- f) Surface supplied air diving must not be conducted at depths deeper than 190 feet (57.9 m).

6.2.2 Manning Requirements

The minimum number of personnel comprising a surface-supplied dive team is four. They consist of: a Diver and a Tender. a backup diver, and tender. CTSA, DSO, and the DCB will decide when the surface-supplied dive team must be expanded beyond the minimum manning requirements.

6.2.3 Equipment

1. The diver will wear a positive buckling device on the safety harness to which the umbilical hose will be secured. The attachment must be of sufficient strength to prevent any strain on the helmet/full face mask hose connections, and equipment must be configured to allow retrieval of the diver by the surface tender without risk of interrupting air supply to the diver.

2. Each diver must be equipped with a diver-carried independent reserve breathing gas supply containing sufficient volume to complete the ascent to the surface, including all required decompression and safety stops.
3. Surface supplied and mixed gas masks and helmets must have:
 - a) A non-return valve at the attachment point between the mask/helmet and hose which must close readily and positively; and
 - b) An exhaust valve
 - c) Surface-supplied masks and helmets must have a minimum ventilation rate capability of 4.5 actual cubic feet per minute (acfm) at any depth at which they are operated or the capability of maintaining the diver's inspired carbon dioxide partial pressure below 0.02 atmospheres absolute (ATA) when the diver is producing carbon dioxide at the rate of 1.6 standard liters per minute
 - d) Helmets or masks connected directly to the dry suit or other buoyancy-changing equipment must be equipped with an exhaust valve
 - e) Air supplied to the diver must meet the air quality standards outlined in section 3.40

6.3 Surface Supplied in Aquariums

6.3.1 pneumofathometer

In an aquarium habitat where the maximum depth is known, a pneumofathometer is not required.

6.3.2 Depth

The maximum obtainable depth of the aquarium may be used as the diving depth

6.3.3 Tender

One tender may line-tend multiple divers, provided the tender is monitoring only one air source, there is mutual assistance between divers, there are no overhead obstructions or entanglements, or other restrictions as defined by CTSA DCB.

6.4 Hookah

6.4.1 Hookah Definition

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

6.4.2 Equipment Requirements

1. The air supply hose must be rated for a minimum operating pressure of 130psi.
2. Air supplied to the hookah diver must meet the air quality standards outlined in section 3.60
3. Hookah supply systems must be capable of supplying all divers breathing from the system with sufficient gas for comfortable breathing for the planned depth and workload.

4. Hookah system second stage should be capable of being attached to the diver in a way to avoid pulling stress on the second stage mouthpiece and affords easy release if the diver must jettison the regulator and hose.
5. An independent reserve breathing gas supplied will be carried by each hookah diver:
 - a) When the diver does not have direct access to the surface or
 - b) At depths or distance from alternate breathing gas source determined by the DCB.

6.4.3 Operational Requirements

1. Hookah diving must not be conducted beyond depths or distance from alternate breathing gas sources as determined by the DCB.
2. A diver's independent reserve breathing gas supply, if worn, must contain sufficient volume to allow the diver(s) to exit to the surface or alternate breathing gas source
3. Hookah divers not supported by a diving bell or underwater habitat must not be exposed to dives that require staged decompression.

6.4.4 Hookah Diving in Aquariums

1. A depth gauge is not required in an aquarium habitat where the maximum depth is known and planned for.
2. The maximum obtainable depth of the aquarium may be used as the maximum diving depth.
3. A hookah configured diver may operate without an in-water buddy in an aquarium provided the diver is tended from the surface; has visual, line pull, or voice communication with the tender; the diver carries an independent reserve breathing gas source containing sufficient volume to allow the diver to exit to the surface or alternate breathing gas source; and under other operational conditions as determined by the CTSA DCB.

7 SECTION 8.00 STAGED DECOMPRESSION DIVING

Decompression diving is defined as any diving during which the diver cannot perform a direct return to the surface without performing a mandatory decompression stop to allow the release of inert gas from the diver's body.

The following procedures must be observed when conducting dives requiring planned decompression stops.

7.1 Minimum Experience and Training Requirements

7.1.1 Prerequisites

1. Scientific Diver qualification according to Section 4.00.
2. Minimum of 100 logged dives with experience in the depth range where decompression dives will be conducted.
3. Demonstration of the ability to safely plan and conduct dives deeper than 100 feet.
4. Nitrox certification/authorization according to Section 6.00.

7.1.2 Training

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

Minimum Training must include the following:

1. A minimum of 6 hours of classroom training to ensure theoretical knowledge to include: physics and physiology of decompression; decompression planning and procedures; gas management; equipment configurations; decompression method, emergency procedures, and omitted decompression.
2. It is recommended that at least one training session be conducted in a pool or sheltered water setting to cover equipment handling and familiarization, swimming and buoyancy control, estimate gas consumption rates, and practice emergency procedures.
3. At least 6 open-water training dives simulating/requiring decompression must be conducted, emphasizing planning and execution of necessary decompression dives and including the practice of emergency procedures.
4. Progression to greater depths must be by 6-dive increments at depth intervals as specified in Section 5.50.
5. No training dives requiring decompression shall be conducted until the diver has demonstrated acceptable skills under simulated conditions.
6. The following are the minimum skills the diver must demonstrate proficiently during dives simulating and requiring decompression:
 - Buoyancy control
 - Proper ascent rate
 - Proper depth control
 - Equipment manipulation
 - Stage/decompression bottle use as pertinent to planned diving operation
 - Buddy skills

- Gas management
 - Time management
 - Task loading
 - Emergency skills
1. Divers must demonstrate to the DSO's satisfaction or the DSO's qualified designee proficiency in planning and executing required decompression dives appropriate to the conditions in which diving operations are to be conducted.
 2. Upon completion of training, the diver must be authorized to conduct required decompression dives with DSO approval.

7.2 Minimum Equipment Requirements

1. Valve and regulator systems for primary (bottom) gas supplies must be configured in a redundant manner that allows continuous breathing gas delivery in the event of failure of any one component of the regulator/valve system.
2. Cylinders with volume and configuration adequate for planned diving operations
3. One of the second stages on the primary gas supply must be configured with a hose of adequate length to facilitate effective emergency gas sharing in the intended environment.
4. Minimum dive equipment should include:
 - a) Diver location devices adequate for the planned diving operations and environment.
 - b) Compass
5. Redundancy in the following components are required by CTSA DCB;
 - a) Decompression Schedules
 - b) Dive Timing Devices
 - c) Depth gauges
 - d) Buoyancy Control Devices
 - e) Cutting devices
 - f) Lift bags and line reels

7.3 Minimum Operational Requirements

1. The maximum pO₂ to be used for planning required decompression dives is 1.6 for open circuit. It is recommended that a pO₂ of less than 1.6 be used during bottom exposure.
2. Decompression dives may be planned using dive tables, dive computers, and/or PC software approved by the DCB.
3. Breathing gases used while performing in-water decompression must contain the same or greater oxygen content used during the bottom phase of the dive.
4. The dive team, before each dive, must review emergency decompression procedures appropriate for the planned dive.
5. If breathing gas mixtures other than air are used for required decompression, their use must be per those regulations outlined in the appropriate sections of this Manual.
6. Use of additional nitrox and/or high-oxygen fraction decompression mixtures as travel and decompression gases to decrease decompression obligations is recommended.
7. Use of alternate inert gas mixtures to limit narcosis is recommended for depths greater than 150 feet.
8. The maximum depth for required decompression using air as the bottom gas is 190 feet.

9. If a period of more than 6 months has elapsed since the last decompression dive, a series of progressive workup dives defined by the DCB to return the diver(s) to proficiency status before the start of project diving operations are required
10. Mission-specific workup dives are recommended.

8 SECTION 9.00 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.

8.1 Minimum Experience and Training Requirements

8.1.1 Prerequisites

1. Nitrox authorization (Section 6.00).
2. If the intended use entails required decompression stops, divers will be previously authorized in decompression diving (Section 8.00).
3. Divers must demonstrate to the DCB's satisfaction skills, knowledge, and attitude appropriate for training in the safe use of mixed gases.

8.1.2 Classroom training including

1. Review of topics and issues previously outlined in nitrox and required decompression diving training as pertinent to the planned operations
2. The use of helium or other inert gases and the use of multiple decompression gases
3. Equipment configurations
4. Mixed gas decompression planning
5. Gas management planning
6. Thermal considerations
7. END determination
8. Mission planning and logistics
9. Emergency procedures
10. Mixed gas production methods
11. Methods of gas handling and cylinder filling
12. Oxygen exposure management
13. Gas analysis 14. Mixed gas physics and physiology

8.1.3 Practical Training

1. Confined water session(s) in which divers demonstrate proficiency in required skills and techniques for proposed diving operations.
2. A minimum of 6 open water training dives.
3. At least one initial dive must be in 130 feet or less to practice equipment handling and emergency procedures.
4. Subsequent dives will gradually increase in depth, with a majority of the training dives being conducted between 130 feet and the planned operational depth.
5. Planned operational depth for initial training dives must not exceed 260 feet. 40
6. Diving operations beyond 260 feet requires additional training dives.

8.2 Equipment and Gas Quality Requirements

1. Equipment requirements must be developed and approved by the DCB. Equipment must meet other pertinent requirements set forth elsewhere in this Manual.

2. The quality of inert gases used to produce breathing mixtures must be of an acceptable grade for human consumption.

8.3 Minimum Operational Requirements

1. All applicable operational requirements for nitrox and decompression diving must be met.
2. The maximum pO₂ to be used for planning required open-circuit decompression dives is 1.6. It is recommended that a pO₂ of less than 1.6 be used during bottom exposure.
3. Divers decompressing on high-oxygen concentration mixtures must closely monitor one another for acute oxygen toxicity signs.
4. If a period of more than 6 months has elapsed since the last decompression dive, a series of progressive workup dives defined by the DCB to return the diver(s) to proficiency status before the start of project diving operations are required.
5. Mission-specific workup dives are recommended.

9 SECTION 10.00 SPECIALIZED DIVING ENVIRONMENTS

Certain types of diving, some of which are listed below, require equipment or procedures that require training. Supplementary guidelines for these technologies are in development by the AAUS. OM's using these, must have guidelines established by their Diving Control Board. Divers must comply with all scuba diving procedures in this Manual unless specified.

9.1 Blue Water Diving

Bluewater diving is defined as diving in open water where the bottom is generally greater than 200 feet deep. It requires special training and the use of multiple-tethered diving techniques. Specific guidelines that should be followed are outlined in "Blue Water Diving Guidelines" (California Sea Grant Publ. No. T-CSGCP-014).

9.2 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.

9.3 Overhead Environments

Overhead environments include water-filled Caverns, Caves, Flooded Mines, and Ice diving, as well as portions of Sunken Shipwrecks and other manmade structures. For the purposes of this Manual, Ice diving is a specialized overhead environment addressed in Section 10.20 and supplemented by requirements and protocols established by the CTSA DCB. Cavern, Cave, or Flooded Mine Diving see Section 12 It is the CTSA DCB's responsibility to set forth the requirements and protocol under which diving will be safely conducted in overhead environment portions of sunken shipwrecks and other manmade structures.

9.4 Saturation Diving

CTSA prohibits saturation diving at this time.

9.5 Aquarium Diving

An aquarium is an artificial, confined body of water operated by or under the control of an institution and is used for 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, CTSA defers to the Institution operating the facility. CTSA DCB and DSO must review the hosting organization's dive safety procedures and approve the protocol under which diving will be safely conducted.

Appendix

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 certification as a Scientific Diver for the _____ (Organizational Member). 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 _____ standards. Thank you for your assistance.

Organizational Member

Diving Safety Officer

Date

Printed Name

Phone Number

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

(Adapted from Bove, 1998: bracketed numbers are pages in Bove)

9.5.1.1.1.1 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]

TO THE EXAMINING PHYSICIAN:

This person, _____, requires a medical examination to assess their fitness for certification as a Scientific Diver for the _____ (Organizational Member). 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 _____ standards. Thank you for your assistance.

Organizational Member

Diving Safety Officer

Date

Printed Name

Phone Number

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

(Adapted from Bove, 1998: bracketed numbers are pages in Bove)

9.5.1.1.1.2 *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]
27. Pregnancy. [56]

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 certification as a Scientific Diver for Connecticut Scuba Academy. 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 Connecticut Scuba Academy standards. Thank you for your assistance.

Diving Safety Officer Thomas Montuori

621 Yalesville Rd Cheshire, CT 06410

Phone Number (203) 806-0027

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.

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]
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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]
28. Pregnancy. [56]

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. 5.00). 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 otological components
- Urinalysis
- Any further tests deemed necessary by the physician

ADDITIONAL TESTS DURING FIRST EXAM OVER AGE 40 AND PERIODIC RE-EXAMS (OVER AGE 40):

- Chest x-ray (Required only during first exam over age 40)
- Resting EKG
- Assessment of coronary artery disease using Multiple-Risk-Factor Assessment¹ (age, lipid profile, blood pressure, diabetic screening, smoking)

Note: Exercise stress testing may be indicated based on Multiple-Risk-Factor Assessment¹

PHYSICIAN'S STATEMENT:

I have evaluated the above mentioned individual according to the tests listed above. I have discussed with the patient any medical condition(s) that would not disqualify 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.

_____ 01 I find no medical conditions that may be disqualifying for participation in scuba diving.

Diver **IS** medically qualified to dive for:

_____ 2 years (over age 60)

_____ 3 years (age 40-59)

_____ 5 years (under age 40)

_____ 02 Diver **IS NOT** medically qualified to dive: _____ Permanently _____ Temporarily.

_____ MD or DO _____

Signature

Date

Name (Print or Type)

Address

Telephone Number

E-Mail Address

My familiarity with applicant is: _____ This exam only _____ Regular physician for _____ years

My familiarity with diving medicine is: _____

APPENDIX 2B

AAUS MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING REPORT

APPLICANT'S RELEASE OF MEDICAL INFORMATION FORM

Name of Applicant (Print or Type) _____

I authorize the release of this information and all medical information subsequently acquired in association with my diving to the
_____ 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

Name _____ DOB ____ 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 certification procedure.

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

Should your answers indicate a condition, which might make diving hazardous, you will be asked to review the matter with your physician. In such instances, their written authorization will be required in order for further consideration to be given to your application. If your physician concludes that diving would involve undue risk for you, remember that they are concerned only with your well-being and safety.

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

12			Had a major operation	
13			Presently being treated by a physician	
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	
	Yes	No	Please indicate whether or not the following apply to you	Comments
23			Take tranquilizers	
24			Perforated ear drums	
25			Hay fever	
26			Frequent sinus trouble, frequent drainage from the nose, post-nasal drip, or stuffy nose	
27			Frequent earaches	
28			Drainage from the ears	
29			Difficulty with your ears in airplanes or on mountains	
30			Ear surgery	
31			Ringing in your ears	
32			Frequent dizzy spells	
33			Hearing problems	
34			Trouble equalizing pressure in your ears	
35			Asthma	

36			Wheezing attacks	
37			Cough (chronic or recurrent)	
38			Frequently raise sputum	
39			Pleurisy	
40			Collapsed lung (pneumothorax)	
41			Lung cysts	
42			Pneumonia	
43			Tuberculosis	
44			Shortness of breath	
45			Lung problem or abnormality	
46			Spit blood	
47			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	

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

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

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

Signature

Date

APPENDIX 4

RECOMMENDED PHYSICIANS WITH EXPERTISE IN DIVING MEDICINE

A List of Medical Doctors that have training and expertise in diving or undersea medicine can be found through the Undersea and Hyperbaric Medical Society or Divers Alert Network. See links below

<https://www.uhms.org/resources/diving-medical-examiners-list.html>

<https://www.diversalertnetwork.org/medical/physicians.asp>

1. Name: _____

Address: _____

Telephone: _____

2. Name: _____

Address: _____

Telephone: _____

3. Name: _____

Address: _____

Telephone: _____

4. Name: _____

Address: _____

Telephone: _____

APPENDIX 5

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 – Surface Supplied diving mode manning requirement. An individual designated by the OM DCB or designee with the experience or training necessary to direct, and oversee in the surface supplied diving operation being conducted.

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.

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

FSW - Feet of seawater.

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

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

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

Hookah - While similar to Surface Supplied in that the breathing gas is supplied from the surface by means of a pressurized hose, the supply hose does not require a strength member, pneumofathometer hose, or communication line. Hookah equipment may be as simple as a long hose attached to a standard scuba cylinder supplying a standard scuba second stage. The diver is responsible for the monitoring his/her 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 7

EMERGENCY ACTION PLAN

Introduction

A diving accident victim could be any person who has been breathing compressed gas 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 OM 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 recompression chamber, etc.
6. Notify DSO or designee according to the Emergency Action Plan of the OM.
7. Complete and submit Incident Report Form (www.aaus.org) to the DCB of the organization and the AAUS ([Section 2.70 Required Incident Reporting](#)).

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 recompression chamber.
- Nearest accessible hospital.
- Available means of transport.

APPENDIX 8

AAUS STATISTICE COLLECTING 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

Dive Time in Minutes is defined as the surface-to-surface time including any safety or required decompression stops.

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.

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.

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.

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 his/her 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
- 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:

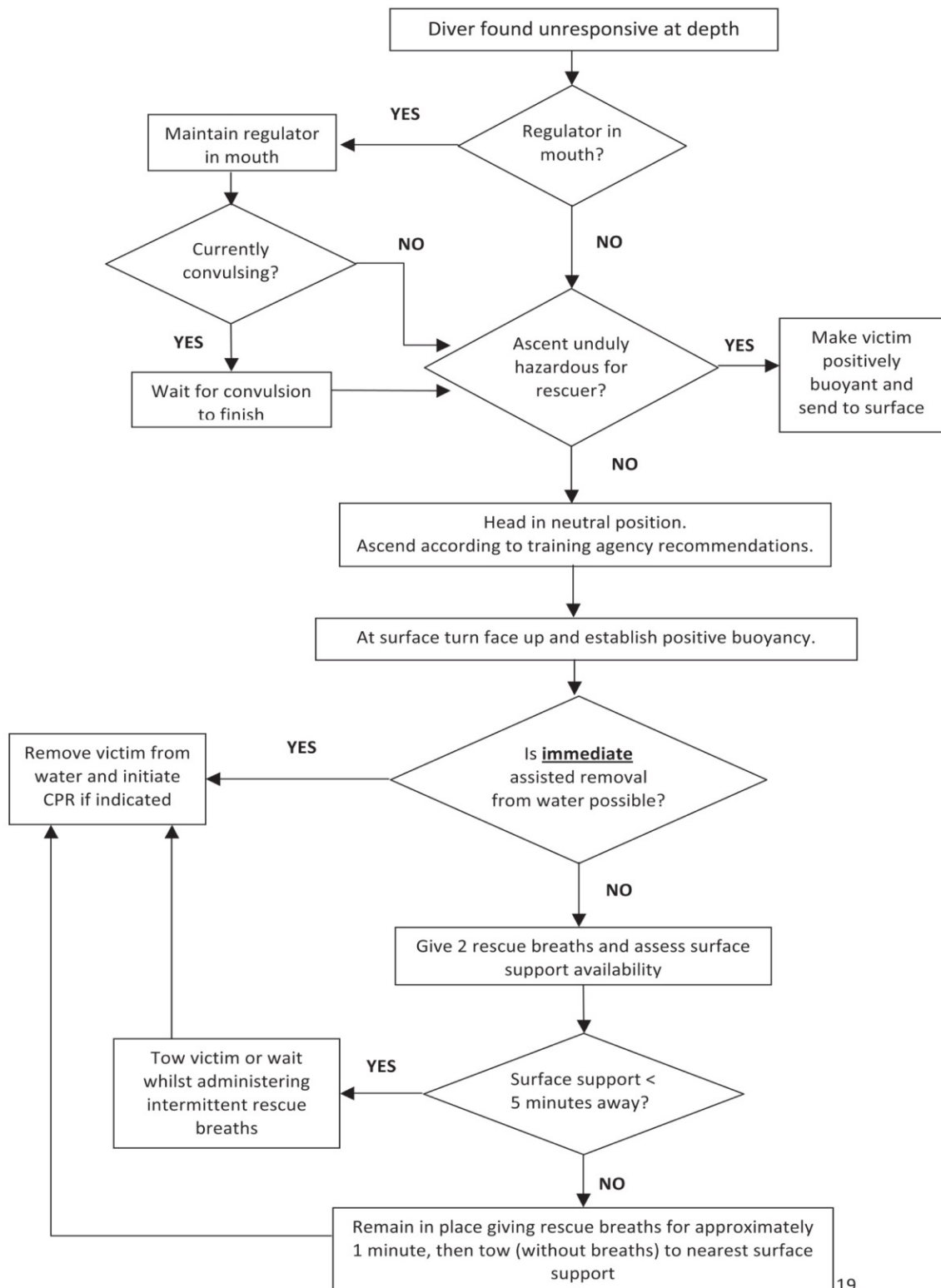
- Hyperbaric: Decompression Sickness, AGE, or other barotrauma requiring recompression therapy.
- Barotrauma: Barotrauma requiring medical attention from a physician or medical facility, but not requiring recompression therapy.
- Injury: Any non-barotrauma injury occurring during a dive that requires 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.
- Hyperoxic/Oxygen Toxicity: An incident that can be attributed to the diver being exposed to too high a partial pressure of oxygen.
- Hypercapnea: 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:

- 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 being 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.
 - Hypercapnea.
 - Spinal injuries.
 - Heart attack.
 - Fatality.

Appendix 9

Recommendations for Rescue of a submerged unresponsive diver



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