

STANDARDS FOR SCIENTIFIC DIVING CERTIFICATION
AND OPERATION OF SCIENTIFIC DIVING PROGRAMS

The American Academy of Underwater Sciences

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FOREWORD

Since 1951 the scientific diving community has 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.

This document represents the minimal safety standards for scientific diving at the present day. As diving science progresses so shall this manual, and it is the responsibility of every member of the Academy to see that it always reflects state of the art, safe diving practice.

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SECTION 1.00

GENERAL POLICY

1.10 THE SCIENTIFIC DIVING STANDARDS

1.11 Purpose

The purpose of these Scientific Diving Standards is to ensure that all scientific diving is conducted in a manner that will maximize protection of scientific divers from accidental injury and/or illness, and to set forth standards for training and certification which will allow a working reciprocity between organizational members. Fulfillment of the purposes shall be consistent with the furtherance of research and safety.

This document sets minimal standards for the establishment of the American Academy of Underwater Sciences (AAUS)-recognized scientific diving programs, the organization for the conduct of these programs, and the basic regulations and procedures for safety in scientific diving operations. It also establishes a framework for reciprocity between AAUS organizational members which adhere to these minimum standards.

This manual was developed and written by the AAUS by compiling the policies set forth in the diving manuals of several university, private, and governmental scientific diving programs. These programs share a common heritage with the scientific diving program at the Scripps Institution of Oceanography (SIO). Adherence to the SIO standards has proven both feasible and effective in protecting the health and safety of scientific divers since 1954.

In 1982, OSHA exempted scientific diving from commercial diving regulations (29 CFR Part 1910, Subpart T) under certain conditions which are outlined below. The final guidelines for the exemption became effective in 1985 (Federal Register, Vol. 50, No.6, p.1046) The AAUS is recognized by OSHA as the scientific diving standard setting organization.

Additional standards which extend this document may be adopted by each organizational member, according to local procedure.

1.12 Scientific Diving Definition

Scientific diving is defined (29 CFR 1910.402) 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.

1.13 Scientific Diving Exemption

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

1.13.1 The Diving Control Board consists of a majority of active scientific divers and has autonomous and absolute authority over the scientific diving program's operation.

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

1.13.3 The tasks of a scientific diver are those of an observer and data gatherer. Construction and trouble-shooting tasks traditionally associated with commercial diving are not included within scientific diving.

1.13.4 Scientific divers, based on the nature of their activities, must use scientific expertise in studying the underwater environment and therefore, are scientists or scientists-in-training.

1.13.5 In addition, the scientific diving program shall contain at least the following elements:

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

1.13.5.2 Diving control (safety) board, with the majority of its members being active scientific divers, which shall 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.

1.14 Representations, Warranties, Assumption of the Risk, Release, Hold Harmless and Indemnification of AAUS

1.14.1 By adopting some or all of the standards and policies set forth in this manual, each adopting member thereby represents and warrants to AAUS that the adopting member has thoroughly reviewed the appropriateness of these standards and policies for its own programs and purposes, that the adopting member has made a professionally informed, independent decision that the AAUS standards and policies are in every instance and every detail suitable for the intended use by that member, and that the adopting member freely and voluntarily makes an informed choice to assume all risks associated with the application and use of these standards and policies in any diving or diving related activities.

1.14.2. By adopting some or all of the standards and policies set forth in this manual, each adopting member represents and agrees that the same adopting member has made a professionally informed decision to release AAUS, and thereby does release AAUS, from any and all losses, costs, injuries, death or damages, including attorney fees, caused in whole or in part by, or resulting in whole or in part from, the implementation, use or application of these standards and policies to any diving or diving-related activities, or caused in whole or in part by, or resulting in whole or in part from, acts or omissions of the adopting member, its officers, directors, employees, students, volunteers or invitees.

1.14.3. By adopting some or all of the standards and policies set forth in this manual, each adopting member represents and agrees that the same adopting member has made a professionally informed decision to hold harmless and indemnify AAUS, and thereby does hold harmless and indemnify AAUS, from and against any and all losses, costs, injuries, death or damages, including attorney fees, caused in whole or in part by, or resulting in whole or in part from, the implementation, use or application of these standards and policies to any diving or diving-related activities, or caused in whole or in part by, or resulting in whole or in part from, acts or omissions of the adopting member, its officers, directors, employees, students, volunteers or invitees.

1.15 Review of Standards

As part of each organizational member's annual report, any recommendations for modifications of these standards shall be submitted to the AAUS for consideration.

1.20 OPERATIONAL CONTROL

1.21 Organizational Member Auspices Defined

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

It is the organizational member's responsibility to adhere to the AAUS Standards for Scientific Diving Certification and Operation of Scientific Diving Programs. The administration of the local diving program will reside with the organizational member's Diving Control Board (DCB).

The regulations herein shall be observed at all locations where scientific diving is conducted.

1.22 Organizational Member's Scientific Diving Standards and Safety Manual

Each organizational member shall develop and maintain a scientific diving safety manual which provides for the development and implementation of policies and procedures that will enable each organizational member to meet requirements of local environments and conditions as well as to comply with the AAUS scientific diving standards. The organizational member's scientific diving standards shall include, but not be limited to:

1.22.1 The AAUS Standards may be used as a set of minimal guidelines for the development of an organizational member's scientific diving safety manual.

1.22.2 Emergency evacuation and medical treatment procedures.

1.22.3 The criteria for diver training and certification.

1.22.4 Standards written or adopted by reference for each diving mode utilized which include the following:

1.22.4.1 Safety procedures for the diving operation.

1.22.4.2 Responsibilities of the dive team members.

1.22.4.3 Equipment use and maintenance procedures.

1.22.4.4 Emergency procedures.

1.23 The Diving Safety Officer

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

1.23.1 Qualifications

1.23.1.1 Shall be appointed by the responsible administrative officer or his/her designee, with the advice and counsel of the diving control board.

1.23.1.2 Shall be trained as a scientific diver.

1.23.1.3 Shall be a member as defined by the AAUS.

1.23.1.4 Shall be certified as a scuba diving instructor or have equivalent diving supervisory experience.

1.23.2 Duties and Responsibilities

1.23.2.1 Shall be responsible, through the DCB, to the responsible administrative officer or his/her designee, for the conduct of the scientific diving program of the membership organization. The routine operational authority for this program, including the conduct of training and certification, approval of dive plans, maintenance of diving records, and ensuring compliance with this manual and all relevant regulations of the membership organization, rests with the Diving Safety Officer.

1.23.2.2 May permit portions of this program to be carried out by a qualified delegate, although the Diving Safety Officer may not delegate responsibility for the safe conduct of the local diving program.

1.23.2.3 Shall be guided in the performance of the required duties by the advice of the DCB, but operational responsibility for the conduct of the local diving program will be retained by the Diving Safety Officer.

1.23.2.4 Shall suspend diving operations which he/she considers to be unsafe or unwise.

1.24 The Diving Control Board

1.24.1 The Diving Control Board (DCB) shall consist of a majority of active scientific divers. Voting members shall include the Diving Safety Officer, the responsible administrative officer, or his/her designee, and should include other representatives of the diving program such as qualified divers and members selected by procedures established by each organizational member. A chair-person and a secretary may be chosen from the membership of the board according to local procedure.

1.24.2 Has autonomous and absolute authority over the scientific diving program's operation.

1.24.3 Shall approve and monitor diving projects.

1.24.4 Shall review and revise the diving safety manual.

1.24.5 Shall assure compliance with the manual.

1.24.6 Shall certify the depths to which a diver has been trained.

1.24.7 Shall take disciplinary action for unsafe practices.

1.24.8 Shall assure adherence to the buddy system for scuba diving.

1.24.9 Shall act as the official representative of the membership organization in matters concerning the scientific diving program.

1.24.10 Shall act as a board of appeal to consider diver-related problems.

1.24.11 Shall recommend the issue, reissue, or the revocation of diving certifications.

1.24.12 Shall recommend changes in policy and amendments to the AAUS and the membership organization's scientific diving manual as the need arises.

1.24.13 Shall establish and/or approve training programs through which the applicants for certification can satisfy the requirements of the organizational member's diving safety manual.

1.24.14 Shall suspend diving programs which it considers to be unsafe or unwise.

1.24.15 Shall establish criteria for equipment selection and use.

1.24.16 Shall recommend new equipment or techniques.

1.24.17 Shall establish and/or approve facilities for the inspection and maintenance of diving and associated equipment.

1.24.18 Shall ensure that the organizational member's air station(s) meet air quality standards as described in Sec. 3.60 of this manual.

1.24.19 Shall periodically review the Diving Safety Officer's performance and program.

1.24.20 Shall sit as a board of investigation to inquire into the nature and cause of diving accidents or violations of the organizational member's diving manual.

1.25 Instructional Personnel

1.25.1 Qualifications

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

1.25.2 Selection

Instructional personnel will be selected by the responsible administrative officer, or his/her designee, who will solicit the advice of the DCB in conducting preliminary screening of applicants for instructional positions.

1.26 Lead Diver

For each dive, one individual shall be designated as the Lead Diver. He/she shall be at the dive location during the diving operation. The Lead Diver shall be responsible for:

1.26.1 Coordination with other known activities in the vicinity which are likely to interfere with diving operations.

1.26.2 Ensuring all dive team members possess current certification and are qualified for the type of diving operation.

1.26.3 Planning dives in accordance with section 2.21

1.26.4 Ensuring safety and emergency equipment is in working order and at the dive site.

1.26.5 Briefing the dive team members on:

1.26.5.1 Dive objectives.

1.26.5.2 Unusual hazards or environmental conditions likely to affect the safety of the diving operation.

1.26.5.3 Modifications to diving or emergency procedures necessitated by the specific diving operation.

1.26.6 Suspending diving operations if in his/her opinion conditions are not safe.

1.26.7 Reporting to the DSO and DCB any physical problems or adverse physiological effects including symptoms of pressure-related injuries.

1.27 Reciprocity And Visiting Scientific Diver

1.27.1 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 Diving Control Boards to govern the joint dive project.

1.27.2 A scientific diver from one Organizational Member shall apply for permission to dive under the auspices of another Organizational Member by submitting to the Diving Safety Officer of the host Organizational Member a document containing all the information described in Appendix 8. (letter of reciprocity) signed by the Diving Safety Officer or Chairperson of the home Diving Control Board.

1.27.3 A visiting scientific diver may be asked to demonstrate his/her knowledge and skills for the planned diving. An example of items to be demonstrated is presented in Appendix 9 (checkout dive)

1.27.4 If a host Organizational Member denies a visiting scientific diver permission to dive, the host Diving Control Board shall notify the visiting scientific diver and his/her Diving Control Board with an explanation of all reasons for the denial.

1.28 Waiver of Requirements

The organizational Diving Control Board may grant a waiver for specific requirements of training, examinations, depth certification, and minimum activity to maintain certification.

1.29 Consequence of Violation of Regulations by Scientific Divers

Failure to comply with the regulations of the organizational member's diving manual may be cause for the revocation or restriction of the diver's scientific diving certificate by action of the organizational member's Diving Control Board.

1.30 CONSEQUENCES OF VIOLATION OF REGULATIONS BY ORGANIZATIONAL MEMBERS

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

1.40 RECORD MAINTENANCE

The Diving Safety Officer or his/her designee shall maintain permanent records for each individual scientific diver certified. The file shall include evidence of certification level, log sheets, results of current physical examination, waiver, reports of disciplinary actions by the organizational member Diving Control Board, and other pertinent information deemed necessary.

1.40.1 Availability of Records:

1.40.1.1 Medical records shall be available to the attending physician of a diver or former diver when released in writing by the diver.

1.40.1.2 Records and documents required by this standard shall be retained by the organizational member for the following period:

1.40.1.2.1 Physician's written reports of medical examinations for dive team members - 5 years.

1.40.1.2.2 Manual for diving safety - current document only.

1.40.1.2.3 Records of dive - 1 year, except 5 years where there has been an incident of pressure-related injury.

1.40.1.2.4 Pressure-related injury assessment - 5 years.

1.40.1.2.5 Equipment inspection and testing records - current entry or tag, or until equipment is withdrawn from service.

SECTION 2.00

DIVING REGULATIONS FOR SCUBA (OPEN CIRCUIT, COMPRESSED AIR)

2.10 INTRODUCTION

No person shall engage in scientific diving operations under the auspices of the member's organizational scientific diving program unless he/she holds a current certification issued pursuant to the provisions of this manual.

2.20 PRE-DIVE PROCEDURES

2.21 Dive Plans

Dives should be planned around the competency of the least experienced diver. Before conducting any diving operations under the auspices of the organizational member, the diving supervisor for a proposed operation must formulate a dive plan which should include the following:

2.21.1 Divers qualifications, and the type of certificate or certification held by each diver.

2.21.2 Emergency plan (see Appendix 10) with the following information:

2.21.2.1 Name, telephone number, and relationship of person to be contacted for each diver in the event of an emergency.

2.21.2.2 nearest operational recompression chamber

2.21.2.3 nearest accessible hospital

2.21.2.4 available means of transport

2.21.3 Approximate number of proposed dives.

2.21.4 Location(s) of proposed dives.

2.21.5 Estimated depth(s) and bottom time(s) anticipated.

2.21.6 Decompression status and repetitive dive plans, if required.

2.21.7 Proposed work, equipment, and boats to be employed.

2.21.8 Any hazardous conditions anticipated.

2.22 Pre-dive Safety Checks

2.22.1 Diver's Responsibility:

2.22.1.1 Each scientific diver shall conduct a functional check of his/her diving equipment in the presence of the diving buddy or tender.

2.22.1.2 It is the diver's responsibility and duty to refuse to dive if, in his/her judgement, conditions are unfavorable, or if he/she would be violating the precepts of his/her training, of this manual, or the organizational member's diving manual.

2.22.1.3 No dive team member shall be required to be exposed to hyperbaric conditions against his/her will, except when necessary to prevent or treat a pressure-related injury.

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

2.22.2 Equipment Evaluations

2.22.2.1 Each diver shall insure that his/her equipment is in proper working order and that the equipment is suitable for the type of diving operation.

2.22.2.2 Each diver shall have the capability of achieving and maintaining positive buoyancy.

2.22.3 Site Evaluation

The environmental conditions at the site will be evaluated.

2.30 DIVING PROCEDURES

2.31 Solo Diving Prohibition

All diving activities shall assure adherence to the buddy system (Two comparably equipped scuba divers in the water in constant communication) for scuba diving. This buddy system is based upon mutual assistance, especially in the case of an emergency.

2.32 Refusal to Dive

2.32.1 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 (see Sec. 2.22 #1.).

2.32.2 Safety - The ultimate responsibility for safety rests with the individual diver. It is the diver's responsibility and duty to refuse to dive if, in his/her judgement, conditions are unsafe or unfavorable, or if he/she would be violating the precepts of his/her training or the regulations in this manual.

2.33 Termination of the Dive

2.33.1 It is the responsibility of the diver to terminate the dive, without fear of penalty, whenever he/she feels it is unsafe to continue the dive, unless it compromises the safety of another diver already in the water (see Sec. 2.22 #1.).

2.33.2 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.

2.34 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 must be submitted to the Diving Control Board explaining the circumstances and justifications.

2.40 POST-DIVE PROCEDURES

2.41 Post-Dive Safety Checks

2.41.1 After the completion of a dive, each diver shall report any physical problems, symptoms of decompression sickness, or equipment malfunctions.

2.41.2 When diving outside the no-decompression limits, the divers should remain awake for at least one hour after diving, and in the company of a dive team member who is prepared to transport him/her to a hyperbaric chamber if necessary.

2.50 EMERGENCY PROCEDURES

Each organizational member will develop emergency procedures which follow the standards of care of the community and must include procedures for emergency care, recompression and evacuation for each dive location (See Appendix 10).

2.60 FLYING AFTER DIVING

Divers should have a minimum surface interval of 12 hours before ascending to altitude.

2.70 RECORDKEEPING AND REQUIREMENTS

2.71 Personal Diving Log

Each certified scientific diver shall log every dive made under the auspices of the organizational member's program, and is encouraged to log all other dives. Standard forms will be provided by each membership organization. Log sheets shall be submitted to the Diving Safety Officer to be placed in the diver's permanent file. Details of the submission procedures are left to the discretion of the Diving Safety Officer. The diving log shall be in a form specified by the organization and shall include at least the following:

- 2.71.1 Name of diver, partner, and Lead Diver.
- 2.71.2 Date, time, and location.
- 2.71.3 Diving modes used.
- 2.71.4 General nature of diving activities.
- 2.71.5 Approximate surface and underwater conditions.
- 2.71.6 Maximum depths, bottom time and surface interval time.
- 2.71.7 Diving tables or computers used.
- 2.71.8 Detailed report of any near or actual incidents.

2.72 Required Incident Reporting

All diving incidents requiring recompression treatment, or resulting in moderate or serious injury, or death shall be reported to the organizational member's Diving Control Board and the AAUS. The organizational member'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 must meet the following reporting requirements:

2.72.1 The organizational member shall record and report occupational injuries and illnesses in accordance with requirements of the appropriate Labor Code section.

2.72.2 If pressure-related injuries are suspected, or if symptoms are evident, the following additional information shall be recorded and retained by the organizational member, with the record of the dive, for a period of 5 years:

- 2.72.2.1 Complete AAUS Incident Report Form (Appendix 13).

2.72.2.2 Written descriptive report to include:

2.72.2.2.1 Name, address, phone numbers of the principal parties involved.

2.72.2.2.2 Summary of experience of divers involved.

2.72.2.2.3 Location, description of dive site and description of conditions that led up to incident.

2.72.2.2.4 Description of symptoms, including depth and time of onset.

2.72.2.2.5 Description and results of treatment.

2.72.2.2.6 Disposition of case.

2.72.2.2.7 Recommendations to avoid repetition of incident.

2.72.3 The organizational member shall investigate and document any incident of pressure-related injury and prepare a report which is to be forwarded to the AAUS during the annual reporting cycle. This report must first be reviewed and released by the organizational member's Diving Control Board.

SECTION 3.00

DIVING EQUIPMENT

3.10 GENERAL POLICY

3.10.1 All equipment shall meet standards as determined by the Diving Safety Officer and the Diving Control Board. Equipment that is subjected to extreme usage under adverse conditions should require more frequent testing and maintenance.

3.10.2 All equipment shall be regularly examined by the person using them.

3.20 EQUIPMENT

3.21 Regulators

3.21.1 Approval. Only those makes and models specifically approved by the Diving Safety Officer and the Diving Control Board shall be used.

3.21.2 Inspection and testing. Scuba regulators shall be inspected and tested prior to first use and every twelve months thereafter.

3.21.3 Regulators will consist of a primary second stage and an alternate air source (such as an octopus second stage or redundant air supply).

3.22 Breathing Masks and Helmets

Breathing masks and helmets shall have:

3.22.1 A non-return valve at the attachment point between helmet or mask hose, which shall close readily and positively.

3.22.2 An exhaust valve.

3.22.3 A minimum ventilation rate capable of maintaining the diver at the depth to which he/she is diving.

3.23 Scuba Cylinders

3.23.1 Scuba cylinders shall be designed, constructed, and maintained in accordance with the applicable provisions of the Unfired Pressure Vessel Safety Orders.

3.23.2 Scuba cylinders must be hydrostatically tested in accordance with DOT standards.

3.23.3 Scuba cylinders must have an internal inspection at intervals not to exceed twelve months.

3.23.4 Scuba cylinder valves shall be functionally tested at intervals not to exceed twelve months.

3.24 Backpacks without integrated floatation devices and weight systems shall have a quick release device designed to permit jettisoning with a single motion from either hand.

3.25 Gauges

Gauges shall be inspected and tested before first use and every twelve months thereafter.

3.26 Flotation Devices

3.26.1 Each diver shall have the capability of achieving and maintaining positive buoyancy.

3.26.2 Personal flotation systems, buoyancy compensators, dry suits, or other variable volume buoyancy compensation devices shall be equipped with an exhaust valve.

3.26.3 These devices shall be functionally inspected and tested at intervals not to exceed twelve months.

3.27 Timing Devices, Depth and Pressure Gauges

Both members of the diving pair must have an underwater timing device, an approved depth indicator, and a submersible pressure gauge.

3.28 Determination of Decompression Status: Dive Tables, Dive Computers

3.28.1 A set of diving tables, approved by the Diving Control Board, must be available at the dive location.

3.28.2 Dive computers may be utilized in place of diving tables, and must be approved by the Diving Control Board.

3.28.3 See Appendix 12 for AAUS recommendations on dive computers.

3.30 AUXILIARY EQUIPMENT

3.31 Hand held 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 from the dive location until requested by the diver.

3.40 SUPPORT EQUIPMENT

3.41 First aid supplies.

A first aid kit and emergency oxygen shall be available.

3.42 Diver's Flag

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

3.43 Compressor Systems - Organizational Member Controlled

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

3.43.1 Low pressure compressors used to supply air to the diver if equipped with a volume tank shall have a check valve on the inlet side, a relief valve, and a drain valve.

3.43.2 Compressed air systems over 500 psig shall have slow-opening shut-off valves.

3.43.3 All air compressor intakes shall be located away from areas containing exhaust or other contaminants.

3.44 Oxygen Systems

3.44.1 Equipment used with oxygen or mixtures containing over forty percent (40%) by volume oxygen shall be designed and maintained for oxygen service.

3.44.2 Components exposed to oxygen or mixtures containing over forty percent (40%) by volume oxygen shall be cleaned of flammable materials before being placed into service.

3.44.3 Oxygen systems over 125 psig shall have slow-opening shut-off valves.

3.50 EQUIPMENT MAINTENANCE

3.51 Recordkeeping

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

- 3.51.1. Regulators
- 3.51.2 Submersible pressure gauges
- 3.51.3 Depth gauges
- 3.51.4 Scuba cylinders
- 3.51.5 Cylinder valves
- 3.51.6 Diving helmets
- 3.51.7 Submersible breathing masks
- 3.51.8 Compressors
- 3.51.9 Gas control panels
- 3.51.10 Air storage cylinders
- 3.51.11 Air filtration systems
- 3.51.12 Analytical instruments
- 3.51.13 Buoyancy control devices
- 3.51.14 Dry suits

3.52 Compressor Operation and Air Test Records

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

3.52.2 A log shall be maintained showing operation, repair, overhaul, filter maintenance, and temperature adjustment for each compressor.

3.60 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) and referenced in OSHA 29 CFR 1910.134

CGA Grade E

Component	Maximum
Oxygen	20 - 22%/v
Carbon Monoxide	10 PPM/v
Carbon Dioxide	500 PPM/v
Condensed Hydrocarbons	5 mg/m ³
Water Vapor	NS
Objectionable Odors	None

AAUS SCIENTIFIC DIVER TRAINING FLOW CHART

SECTION 4.00

ENTRY-LEVEL TRAINING REQUIREMENTS

This section describes training for the non-diver applicant, previously not certified for diving.

4.10 EVALUATION

4.11 Medical Examination

The applicant for training shall be certified by a licensed physician to be medically qualified for diving before proceeding with the training as designated in Sec. 4.20 (see Sec. 6.00 and Appendices 1 through 6).

4.12 Swimming Evaluation

The applicant for training shall successfully perform the following tests, or their equivalent, in the presence of the Diving Safety Officer, or an examiner approved by the Diving Safety Officer.

4.12.1 Swim underwater without swim aids for a distance of 25 yards without surfacing.

4.12.2 Swim 400 yards in less than 12 minutes without swim aids.

4.12.3 Tread water for 10 minutes, or 2 minutes without the use of hands, without swim aids.

4.12.4 Without the use of swim aids, transport another person of equal size a distance of 25 yards in the water.

4.20 SCUBA TRAINING

4.21 Practical Training

At the completion of training, the trainee must satisfy the Diving Safety Officer or the instructor of his/her ability to perform the following, as a minimum, in a pool or in sheltered water:

4.21.1 Enter water with full equipment.

4.21.2 Clear face mask.

- 4.21.3 Demonstrate air sharing, including both buddy breathing and the use of alternate air source, as both donor and recipient, with and without a face mask.
- 4.21.4 Demonstrate ability to alternate between snorkel and scuba while kicking.
- 4.21.5 Demonstrate understanding of underwater signs and signals.
- 4.21.6 Demonstrate simulated in-water mouth-to-mouth resuscitation.
- 4.21.7 Rescue and transport, as a diver, a passive simulated victim of an accident.
- 4.21.8 Demonstrate ability to remove and replace equipment while submerged.
- 4.21.9 Demonstrate watermanship ability which is acceptable to the instructor.

4.22 Written Examination

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

- 4.22.1 Function, care, use, and maintenance of diving equipment.
- 4.22.2 Physics and physiology of diving.
- 4.22.3 Diving regulations and precautions.
- 4.22.4 Near-shore currents and waves.
- 4.22.5 Dangerous marine animals.
- 4.22.6 Emergency procedures, including buoyant ascent and ascent by air sharing.
- 4.22.7 Currently accepted decompression procedures.
- 4.22.8 Demonstrate the proper use of dive tables.
- 4.22.9 Underwater communications.
- 4.22.10 Aspects of freshwater and altitude diving.
- 4.22.11 Hazards of breath-hold diving and ascents.
- 4.22.12 Planning and supervision of diving operations.

4.22.13 Diving hazards.

4.22.14 Cause, symptoms, treatment, and prevention of the following: near drowning, air embolism, carbon dioxide excess, squeezes, oxygen poisoning, nitrogen narcosis, exhaustion and panic, respiratory fatigue, motion sickness, decompression sickness, hypothermia, and hypoxia/anoxia.

4.23 Open Water Evaluation

The trainee must satisfy an instructor, approved by the Diving Safety Officer, of his/her ability to perform at least the following in open water:

4.23.1 Surface dive to a depth of 10 feet in open water without scuba.

4.23.2 Demonstrate proficiency in air sharing, including both buddy breathing and the use of alternate air source, as both donor and receiver.

4.23.3 Enter and leave open water or surf, or leave and board a diving vessel, while wearing scuba gear.

4.23.4 Kick on the surface 400 yards while wearing scuba gear, but not breathing from the scuba unit.

4.23.5 Demonstrate judgement adequate for safe diving.

4.23.6 Demonstrate, where appropriate, the ability to maneuver efficiently in the environment, at and below the surface.

4.23.7 Complete a simulated emergency swimming ascent.

4.23.8 Demonstrate clearing of mask and regulator while submerged.

4.23.9 Demonstrate ability to achieve and maintain neutral buoyancy while submerged.

4.23.10 Demonstrate techniques of self-rescue and buddy rescue.

4.23.11 Navigate underwater.

4.23.12 Plan and execute a dive.

4.23.13 Successfully complete 5 open water dives for a minimum total time of 3 hours, of which 1-1/2 hours cumulative bottom time must be on scuba. No more than 3 training dives shall be made in any one day.

4.30 DIVER-IN-TRAINING PERMIT LEVEL

This permit signifies that a diver has completed a minimum of 40 hours of training with at least 5 ocean or open water dives, and possesses a nationally recognized diving certificate.

SECTION 5.00

SCIENTIFIC DIVER CERTIFICATION

5.10 CERTIFICATION TYPES

5.10.1 Scientific Diver Certification.

This is a permit to dive, usable only while it is current and for the purpose intended.

5.10.2 Temporary Diver Permit.

This permit constitutes a waiver of the requirements of Sec. 5.00 and is issued only following a demonstration of the required proficiency in diving. It is valid only for a limited time, as determined by the Diving Safety Officer. This permit is not to be construed as a mechanism to circumvent existing standards set forth in this manual.

Requirements of Sec. 5.31 and 5.32 may be waived by the Diving Safety Officer if the person in question has demonstrated proficiency in diving and can contribute measurably to a planned dive. A statement of the temporary diver's qualifications shall be submitted to the Diving Safety Officer as a part of the dive plan. Temporary permits shall be restricted to the planned diving operation and shall comply with all other policies, regulations, and standards of this manual, including medical requirements.

5.20 GENERAL POLICY

The AAUS requires that no person shall engage in scientific diving unless that person is authorized by an organizational member pursuant to the provisions of this manual. The following are considered minimal standards for a scientific diver certification.

5.21 Prerequisites

Diver-In-Training Permit

This permit signifies that a diver has completed and been certified as at least an open water diver through a nationally or internationally recognized certifying agency, scientific diving program, or its equivalent (Section 4.00).

5.22 Eligibility

Only a person diving under the auspices of an organization that subscribes to the practices of the AAUS is eligible for a scientific diver certification.

5.23 Application

Application for certification shall be made to the Diving Safety Officer on the form prescribed by the organizational member.

5.24 Medical Examination

Each applicant for diver certification shall submit a statement from a licensed physician, based on an approved medical examination, attesting to the applicant's fitness for diving (see Sec. 6.00 and Appendices 1-6).

5.30 REQUIREMENTS FOR SCIENTIFIC DIVER CERTIFICATION

Submission of documents and participation in aptitude examinations does not automatically result in certification. The applicant must convince the Diving Safety Officer and members of the DCB that he/she is sufficiently skilled and proficient to be certified. This skill will be acknowledged by the signature of the Diving Safety Officer. Any applicant who does not possess the necessary judgement, under diving conditions, for the safety of the diver and his/her partner, may be denied organizational member scientific diving privileges. Minimum documentation and examinations required are as follows:

5.31 Documents

5.31.1 Application for certification.

5.31.2 Medical approval.

5.31.3 Proof of diver-in-training permit level or its equivalent.

5.31.4 Emergency Care Training

The trainee must provide proof of training in the following:

- a. cardiopulmonary resuscitation (CPR) (must be current)
- b. emergency oxygen administration (must be current)
- c. first aid for diving accidents

5.32 Training

The diver must complete additional theoretical aspects and practical training beyond the diver-in-training permit level for a minimum cumulative time of 100 hours.

5.32.1 Theoretical aspects should include principles and activities appropriate to the intended area of scientific study. Suggested topics may include, but are not limited to; cardiopulmonary resuscitation (CPR), diving first aid, oxygen administration, accident

management, field neurological exam, dive rescue ,recognition of DCS and AGE, data gathering techniques, collecting, common biota, behavior, installation of scientific apparatus, use of chemicals, site selection, site location and relocation, organism identification, ecology, tagging, photography, archaeology, scientific dive planning, coordination with other agencies, appropriate governmental regulations, AAUS scientific diving regulations, small boat operation, theoretical training in diving technology, specialized equipment to be used, blue water diving, diving in confined spaces, zero visibility diving, research vessel diving, aquarium diving, animal handling, polluted water diving, cold water diving, special gas mixes, decompression theory and its application.

5.32.2 Practical training shall include at least 12 supervised ocean or open water dives (beyond DIT level) in a variety of dive sites and diving conditions, for a cumulative bottom time of 6 hours. No more than 3 of these dives shall be made in one day.

5.33 Examinations

5.33.1 Written examination for the certificate level.

5.33.2 Examination of equipment.

5.33.3 Open water check-out dives to appropriate depths with evaluation of the skills in Sec 4.23 and Appendix 9

5.40 DEPTH CERTIFICATIONS

Diving is not permitted beyond a depth of 190 feet.

5.41 Depth Certification Levels

5.41.1 Certification to 30 Foot Depth

This is the initial permit level, approved upon the successful completion of training listed in Sec. 4.00.

5.41.2 Certification to 60 Foot Depth

A diver holding a 30 foot certificate may be certified to a depth of 60 feet after successfully completing, under supervision, 12 logged training dives to depths between 31 and 60 feet, for a minimum total time of 4 hours.

5.41.3 Certification to 100 and 130 Foot Depths

A diver holding a 60 foot certificate may be certified to depths of 100 and 130 feet respectively, by logging four dives near the maximum depth category. These

qualification dives shall be validated by the signature of two authorized individuals who are divers certified to at least the same depth. The diver shall also demonstrate proficiency in the use of the appropriate Decompression Tables.

5.41.4 Certification to Depths Over 130 Feet

A diver may be certified to depths of 150 and 190 feet after the completion of four dives near each depth. Dives shall be planned and executed under close supervision of a diver certified to this depth. The diver must also demonstrate a knowledge of the special problems of deep diving, and of special safety requirements.

5.42 Progression To Next Depth Level

A certified diver diving under the auspices of the organizational member may exceed his/her depth certification only if accompanied by a diver certified to a greater depth. Under these circumstances the diver may exceed his/her depth limit by one step.

5.50 CONTINUATION OF CERTIFICATE

5.51 Minimum Activity to Maintain Certification

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

5.52 Requalification of Depth Certificate

Once the initial certification requirements of Sec. 5.31 - 5.34 are met, divers whose depth certification has lapsed due to lack of activity may be requalified by procedures adopted by the organization's DCB.

5.53 Medical Examination

All certified scientific divers shall pass a medical examination at the intervals specified in Section 6.12. After each major illness or injury, as described in Sec. 6.12, a certified scientific diver shall receive clearance to return to diving from a physician before resuming diving activities.

5.60 REVOCATION OF CERTIFICATION

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

5.70 RECERTIFICATION

If a diver's certificate expires or is revoked, he/she may be recertified after complying with such conditions as the Diving Safety Officer or the DCB may impose. The diver shall be given an opportunity to present his/her case to the DCB before conditions for recertification are stipulated.

SECTION 6.00

MEDICAL STANDARDS

6.10 MEDICAL REQUIREMENTS

6.11 General

6.11.1 The organizational member 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.

6.11.2 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.

6.11.3 The diver should be free of any chronic disabling disease and be free of any conditions contained in the list of conditions for which restrictions from diving are generally recommended. (Appendix 1)

6.12 Frequency of Medical Evaluations

Medical evaluation shall be completed:

6.12.1 before a diver may begin diving, unless an equivalent initial medical evaluation has been given within the preceding 3 years (2 years if over the age of 40), the member organization has obtained the results of that examination, and those results have been reviewed and found satisfactory by the member organization.

6.12.2 thereafter, at three year intervals up to age 40 and every two years after the age of 40.

6.12.3 after any major injury or illness, or any condition requiring hospitalization for more than 24 hours requires clearance to return to diving from a physician. If the injury or illness is pressure related then the clearance to return to diving must come from a physician trained in diving medicine.

6.13. Information Provided Examining Physician

The organizational member shall provide a copy of the medical evaluation requirements of this standard to the examining physician. (Appendices 1, 2, and 3).

6.14 Content of Medical Evaluations

Medical examinations conducted initially and at the intervals specified in section 6.12 shall consist of the following:

6.14.1 Applicant agreement for release of medical information to the Diving Safety Officer and the DCB (See Appendix 2).

6.14.2 Medical history (See Appendix 3)

6.14.3 Diving physical examination (Section 6.15 and Appendix 2).

6.15 Conditions for which Restriction from Diving is Recommended (Adapted from Davis, 1986) (See Appendix 1).

6.16 Laboratory Requirements for Diving Medical Examination:

6.16.1 Initial examination and first examination over age forty:

Medical History

Chest X-ray

12 lead EKG

Pulmonary function

Audiogram

Visual acuity

Complete blood count (CBC)

Blood chemistry

Urinalysis

Any further tests deemed necessary by the physician to qualify the patient for scuba diving.

6.16.2 Periodic re-examination (every 3 years up to age 40, every 2 years after age 40):

Medical History

Pulmonary function

Audiogram

Visual acuity

Complete blood count (CBC)

Blood chemistry

Urinalysis

Any further tests deemed necessary by the physician to qualify the patient for scuba diving.

6.17 Physician's Written Report.

6.17.1 After any medical examination relating to the individual's fitness to dive, the organizational

member shall obtain a written report prepared by the examining physician, which shall contain the examining physician's opinion of the individual's fitness to dive, including any recommended restrictions or limitations. This will be reviewed by the DCB.

6.17.2 The organizational member shall make a copy of the physician's written report available to the individual.

SECTION 7.00 OTHER DIVING TECHNOLOGY

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

7.01 Staged Decompression Diving

No diver shall plan or conduct staged decompression dives without prior approval of the Diving Control Board.

7.02 Saturation Diving

If using open circuit compressed air scuba in saturation diving operations, divers shall comply with the saturation diving guidelines of the organizational member.

7.03 Hookah

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

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

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

7.04 Surface Supplied Diving

Surface supplied divers shall comply with all scuba diving procedures in this manual (except Sec. 2.31). Surface supplied diving shall not be conducted at depths greater than 190 fsw (58 msw).

7.04.1 Divers using the surface supplied mode shall be equipped with a diver-carried independent reserve breathing gas supply.

7.04.2 Each surface supplied diver shall be hose tended by a separate dive team member while in the water.

7.04.3 Divers using the surface supplied mode shall maintain voice communication with the surface tender.

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

7.04.5 During surface supplied diving operations when only one diver is in the water, there must be a standby diver in attendance at the dive location.

7.05 Closed and Semi-Closed Circuit Scuba (Rebreathers)

Closed and semi-closed circuit scuba (rebreathers) shall meet the following requirements:

7.01.1 Oxygen partial pressure in the breathing gas shall not exceed values approved by the organizational member's DCB. The generally accepted maximum value is 1.5 atmospheres ppO₂ at depths greater than 25 fsw (7.6 msw).

7.01.2 Chemicals used for the absorption of carbon dioxide shall be kept in a cool, dry location in a sealed container until required for use.

7.01.3 The designated person-in-charge shall determine that the carbon dioxide absorption canister is used in accordance with the manufacturer's instructions.

7.01.4 Closed and semi-closed diving equipment will not be used at a depth greater than that recommended by the manufacturer of the equipment.

7.06 Mixed Gas Diving

7.06.1 Nitrox diving

Divers planning to use enriched air (Nitrox) scuba diving must use the following guidelines which are available through AAUS: "Guidelines for Scientific Nitrox Diving and Nitrox Diver Certification", American Academy of Underwater Sciences, 1991.

7.07 Blue water diving

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

7.08 Ice and Polar diving

Divers planning to dive under ice or in polar conditions should use the following: "Guidelines for Conduct of Research Diving", National Science Foundation, Division of Polar Programs, 1990.

7.09 Overhead Environments

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.

APPENDICIES

APPENDIX 1

DIVING MEDICAL EXAM OVERVIEW FOR THE EXAMINING PHYSICIAN

TO THE EXAMINING PHYSICIAN:

This person, _____, requires a medical examination to assess his/her fitness for certification as a Scientific Diver for the _____.

His /her answers _____ (Organizational) 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. 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.

Organization:

_____	_____
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. Most fatalities involve deficiencies in prudence, judgement, emotional stability or physical fitness. Please consult the following list of conditions which usually restrict candidates from diving.

(Adapted from Davis 1986:47-50, bracketed numbers are pages in Davis)

1. Tympanic membrane perforation or aeration tube [7]
2. Inability to auto-inflate the middle ears [6,7,8]
3. External ear exostoses or osteomas adequate to prevent external ear canal pressure equilibration [4]
4. Meniere's Disease or other chronic vertiginous conditions, status post-surgery, such as subarachnoid endolymphatic shunt for Meniere's Disease [11]
5. Stapedectomy and middle ear prosthesis [9]
6. Chronic mastoiditis or mastoid fistula [5]

7. Any oral or maxillofacial deformity that interferes with the retention of the regulator mouthpiece [43]
8. Corrected near visual acuity not adequate to see tank pressure gauge, watch, decompression tables, and compass underwater. Uncorrected visual acuity not adequate to see the diving buddy or locate the boat in case corrective lenses are lost underwater [13]
9. Radial keratotomy or other recent ocular surgery [14]
10. Claustrophobia of a degree to predispose to panic [15,16]
11. Suicidal ideation [16]
12. Significant anxiety states [16]
13. Psychosis [18]
14. Severe depression [16]
15. Manic states [16]
16. Alcoholism [19,20]
17. Mood-altering drug use [19,20]
18. Improper motivation for diving [16,17,18]
19. Episodic loss of consciousness [1,22]
20. History of seizure. History of seizure in early childhood must be evaluated individually [21]
21. Migraine [20]
22. History of cerebrovascular accident or transient ischemic attack [23]
23. History of spinal cord trauma with neurologic deficit - whether fully recovered or not. [23]
24. Any degenerative or demyelinating CNS process [25]
25. Brain tumor with or without surgery [24]
26. Intracranial aneurysm or other vascular malformation [24]
27. History of neurological decompression sickness with residual deficit [23,24]
28. Head injury with sequelae [21]
29. History of intracranial surgery [24]
30. Sickle cell disease [34]
31. Polycythemia or leukemia [34]
32. Unexplained anemia [34]
33. History of myocardial infarction [28,29,20]
34. Angina or other evidence of coronary artery disease [29]
35. Unrepaired cardiac septal defects [32]
36. Aortic stenosis or mitral stenosis [32]
37. Complete heart block [31]
38. Fixed second-degree heart block [31]
39. Exercised-induced tachyarrhythmias [31,32]
40. Wolf-Parkinson-White (WPW) Syndrome with paroxysmal atrial tachycardia or syncope [31]
41. Fixed-rate pacemakers [33]
42. Any drugs which inhibit the normal cardiovascular response to exercise tolerance [31]
43. Peripheral vascular disease, arterial or venous, severe enough to limit exercise tolerance [33,41]

44. Hypertension with end-organ finding - retinal, cardiac, renal or vascular [30]
45. History of spontaneous pneumothorax [36]
46. Bronchial asthma. History of childhood asthma requires special studies [7,35]
47. Exercise or cold air-induced asthma [36,37]
48. X-ray evidence of pulmonary blebs, bullae, or cysts [36,37]
49. Chronic obstructive pulmonary disease [37]
50. Insulin-dependent diabetes mellitus. Diet or oral medication-controlled diabetes mellitus if there is a history of hypoglycemic episodes [38]
51. Any abdominal wall hernia with potential for gas-trapping until surgically corrected [41]
52. Paraesophageal or incarcerated sliding hiatal hernia [39]
53. Sliding hiatus hernia if symptomatic due to reflux esophagitis [39]
54. Pregnancy [1,45]
55. Osteonecrosis. A history consistent with a high risk of dysbaric osteonecrosis
56. Any condition requiring ingestion of the following medication: antihistamines, bronchodilators, steroids, barbiturates, phenytoin, mood-altering drugs, insulin

Attachments: Medical Evaluation of Fitness for Scuba Diving Report
Diving Medical History Form
Question Evaluations for Diving Medical History Form
Recommended Physicians with Expertise in Diving/Undersea Medicine
References on Diving Medicine

APPENDIX 2

MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING REPORT

Name of Applicant (Print or Type)

Date(Mo/Day/Year)

To The PHYSICIAN:

This person is an applicant for training or is presently certified to engage in diving with self-contained underwater breathing apparatus (scuba). This is an activity which puts unusual stress on the individual in several ways. 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. An absolute requirement is the ability of the lungs, middle ear and sinuses to equalize pressure. Any condition that risks the loss of consciousness should disqualify the applicant.

TESTS: Please initial that the following tests were completed.

Initial Examination
or first over age 40

Re-examination

____ Medical History

____ Medical History

____ Chest X-Ray

____ 12 Lead EKG

____ Pulmonary function

____ Pulmonary function

____ Audiogram

____ Audiogram

____ Visual acuity

____ Visual acuity

____ Complete blood count (CBC)

____ Complete blood count (CBC)

____ Blood chemistry

____ Blood chemistry

____ Urinalysis

____ Urinalysis

RECOMMENDATION:

APPROVAL. I find no medical condition(s) which I consider incompatible with diving.

RESTRICTED ACTIVITY APPROVAL. The applicant may dive in certain circumstances as described in REMARKS.

FURTHER TESTING REQUIRED. I have encountered a potential contraindication to diving. Additional medical tests must be performed before a final assessment can be made. See REMARKS.

REJECT. This applicant has medical condition(s) which, in my opinion, clearly would constitute unacceptable hazards to health and safety in diving

REMARKS:

I have discussed the patient's medical condition(s) which would not seriously interfere with diving but which may seriously compromise subsequent health. The patient understands the nature of the hazards and the risks involved in diving with these defects.

_____ M.D.
Date Signature

Name (Print or Type)

Address

Telephone Number

My familiarity with applicant is: With this exam only
 Regular Physician for _____ years
 Other (describe)_____

My familiarity with diving medicine: On attached list of physicians
 Other (describe)_____

APPLICANT'S RELEASE OF MEDICAL INFORMATION FORM

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 _____

APPENDIX 3
 DIVING MEDICAL HISTORY FORM
 (To Be Completed By Applicant-Diver)

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

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

TO THE APPLICANT:

Scuba diving makes considerable demands on your physical and emotional condition. Diving with particular defects amounts to asking for trouble not only for yourself, but to anyone coming to your aid if you get into difficulty in the water. Therefore, it is prudent to meet certain medical and physical requirements before beginning a diving or training program.

Your answers to the questions are more important, in many instances, in determining your fitness than what the physician may see, hear or feel when you are examined. Obviously, you should give accurate information or the medical screening procedure becomes useless.

This form shall be kept confidential. If you believe any question amounts to invasion of your privacy, you may elect to omit an answer, provided that you shall subsequently discuss that matter with your own physician and he/she 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, his/her 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 he/she is concerned only with your well-being and safety. Respect the advice and the intent of this medical history form.

	Yes	No	Please indicate whether or not the following apply to you
	Comments		
1			Convulsions, seizures, or epilepsy
2			Fainting spells or dizziness
3			Been addicted to drugs
4			Diabetes
5			Motion sickness or sea/air sickness
6			Claustrophobia
7			Mental disorder or nervous breakdown

- 8 Are you pregnant?
- 9 Do you suffer from menstrual problems?
- 10 Anxiety spells or hyperventilation
- 11 Frequent sour stomachs, nervous stomachs or vomiting spells
- 12 Had a major operation
- 13 Presently being treated by a physician
- 14 Taking any medication regularly (even nonprescription)

15	Yes	No	Please indicate whether or not the following apply to you
16	Comments		
15			Been rejected or restricted from sports
16			Headaches (frequent and severe)
17			Wear dental plates
18			Wear glasses or contact lenses
19			Bleeding disorders
20			Alcoholism
21			Any Problems related to diving
22			Nervous tension or emotional problems
23			Take tranquilizers
24			Perforated ear drums
25			Hay fever
26			Frequent sinus trouble, frequent drainage from the nose, post-nasal drip, or stuffy nose
27			Frequent earaches
28			Drainage from the ears
29			Difficulty with your ears in airplanes or on mountains
30			Ear surgery
31			ringing in your ears
32			Frequent dizzy spells
33			Hearing problems
34			Trouble equalizing pressure in your ears
35			Asthma
36			Wheezing attacks
37			Cough (chronic or recurrent)
38			Frequently raise sputum
39			Pleurisy
40			Collapsed lung (pneumothorax)
41			Lung cysts
42			Pneumonia
43			Tuberculosis
44			Shortness of breath
45			Lung problem or abnormality
46			Spit blood
47			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

Yes	No	Please indicate whether or not the following apply to you
Comments		
54		Heart murmur
55		Large heart
56		High blood pressure
57		Angina (heart pains or pressure in the chest)
58		Heart attack
59		Low blood pressure
60		Recurrent or persistent swelling of the legs
61		Pounding, rapid heartbeat or palpitations
62		Easily fatigued or short of breath
63		Abnormal EKG
64		Joint problems, dislocations or arthritis
65		Back trouble or back injuries
66		Ruptured or slipped disk
67		Limiting physical handicaps
68		Muscle cramps
69		Varicose veins
70		Amputations
71		Head injury causing unconsciousness
72		Paralysis
73		Have you ever had an adverse reaction to medication?
74		Do you smoke?
75		Have you ever had any other medical problems not listed? If so, please list or describe below;

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

Signature Date

APPENDIX 4

MEDICAL HISTORY QUESTIONS EVALUATION FORM (Answer Screening Aid)

1 - A	21 - B	41 - A	61 - B
2 - B	22 - B	42 - B	62 - B
3 - B	23 - B	43 - B	63 - B
4 - B	24 - C	44 - B	64 - B
5 - C	25 - B	45 - B	65 - B
6 - B	26 - B	46 - B	66 - B
7 - B	27 - B	47 - B	67 - B
8 - A	28 - B	48 - B	62 - B
9 - B	29 - B	49 - B	69 - B
10 - B	30 - B	50 - B	70 - B
11 - B	31 - B	51 - B	71 - B
12 - B	32 - B	52 - B	72 - B
13 - B	33 - B	53 - B	73 - C
14 - B	34 - C	54 - B	74 - C
15 - B	35 - B	55 - B	75 - B
16 - B	36 - B	56 - B	
17 - C	37 - B	57 - A	
18 - B	38 - B	58 - B	
19 - B	39 - B	59 - B	
20 - B	40 - B	60 - B	

When a "Yes" answer is checked:

A = Absolute contraindication to diving;

B = Relative contraindication to diving, requires careful review by physician;

C = Of interest, not a contraindication.

APPENDIX 5

RECOMMENDED PHYSICIANS WITH EXPERTISE IN DIVING MEDICINE

List of local Medical Doctors that have training and expertise in diving or undersea medicine:

1. _____
Name

Address

Telephone

2. _____
Name

Address

Telephone

3. _____
Name

Address

Telephone

4. _____
Name

Address

Telephone

APPENDIX 6

SELECTED REFERENCES IN DIVING MEDICINE

DIVING MEDICINE, 1990. A. Bove and J. Davis. W.B. Saunders Company, Philadelphia

DIVING AND SUBAQUATIC MEDICINE, Third Edition, 1992. C. Edmonds, C. Lowery and J. Pennefather. Butterworth-Heinemann Ltd. Oxford. (Available from Best Publishing Company, P.O. Box 30100, Flagstaff, AZ 86003-0100)

MEDICAL EXAMINATION OF SPORT SCUBA DIVERS, Jefferson Davis, M.D. (ed.). Best Publishing Company, P.O. Box 30100, Flagstaff, AZ 86003-0100.

NOAA DIVING MANUAL, NOAA. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

SCUBA DIVING IN SAFETY AND HEALTH, C.W. Deuker. Madison Publishing Associates, Diving Safety Digest, P.O. Box 2735, Menlo Park, CA 94026

THE PHYSICIAN'S GUIDE TO DIVING MEDICINE, C.W. Shilling, C.B. Carlston and R.A. Mathias. Plenum Press, New York, NY (Available through the Undersea and Hyperbaric Medical Association, Bethesda, MD)

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

APPENDIX 7

DEFINITION OF TERMS

Air sharing - The sharing of an air supply between divers.

Bottom Time - The total elapsed time measured in minutes from the time when the diver leaves the surface in descent to the time that the diver begins a direct ascent to the surface.

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

Buddy Breathing - The sharing of a single air source between divers.

Buddy Diver - Second member of the dive team.

Buddy system - Two comparably equipped scuba divers in the water in constant communication.

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

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

Certified Diver - A diver who holds a recognized valid certification from a organizational member or recognized certifying agency.

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

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

Decompression Table - A profile or set of profiles of depth-time relationships for ascent rates and breathing mixtures to be followed after a specific depth-time exposure or exposures. (Also called dive tables.)

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 - The physical location of a diver during a dive.

Diver - An individual in the water who uses apparatus, including snorkel, which supplies breathing gas at ambient pressure.

Diver-In-Training - An individual gaining experience and training in additional diving activities under the supervision of a dive team member experienced in those activities.

Diver-Carried 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.

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). The group of individuals who act as the official representative of the membership organization in matters concerning the scientific diving program (see Sec. 1.24).

Diving Safety Officer (DSO) - The individual responsible for the safe conduct of the scientific diving program of the membership organization (see Sec. 1.23).

Emergency Ascent - An ascent made under emergency conditions where the diver exceeds the normal ascent rate.

FSW - Feet of seawater, or equivalent static head.

Hookah Diving - A type of shallow water surface-supplied diving where there is no voice communication with the surface.

Hyperbaric Chamber - See decompression chamber.

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

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

Maximum Working Pressure - The maximum pressure to which a pressure vessel may be exposed under standard operating conditions.

Organizational member - 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 Standards for Scientific Diving Certification and Operation of Scientific Diving Programs.

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

MSW - Meters of seawater or equivalent static head.

No-Decompression limits - The depth-time limits of the "no-decompression limits and repetitive dive group designations table for no-decompression air dives" of the U.S. Navy Diving Manual or equivalent limits.

Normal Ascent - An ascent made with an adequate air supply at a rate of 60 feet per minute or less.

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.

Psig - pounds per square inch gauge.

Recompression Chamber - see decompression chamber.

Scientific Diving - Scientific diving is defined (29 CFR 1910.402) 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.

Standby Diver - A diver at the dive location capable of rendering assistance to a diver in the water.

Surface Supplied Diving - A diving mode in which the diver in the water is supplied from the dive location with compressed gas for breathing.

Swimming Ascent - An ascent which can be done under normal or emergency conditions

accomplished by simply swimming to the surface.

Umbilical - The 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.

Working Pressure - The normal pressure at which the system is designed to operate.

APPENDIX 8
 AAUS REQUEST FOR DIVING RECIPROCITY FORM
 VERIFICATION OF DIVER TRAINING AND EXPERIENCE

A scientific diver that is currently certified under the auspices of an organizational member institution of the American Academy of Underwater Sciences (AAUS) shall be recognized by any other organizational member of AAUS and may apply for reciprocity in order to dive with the host organization.

Organizational members that are in good standing with AAUS operate, at a minimum, under the AAUS Standards for

Scientific Diving Certification and Operation of Scientific Diving Programs (1996 edition). The visiting diver will comply with the diving regulations of the host organization's Diving Safety Manual unless previously arranged by both organization's Diving Control Boards.

The host organization has the right to approve or deny this request and may require, at a minimum, a checkout dive with the Diving Safety Officer (DSO) or designee of the host organization. If the request is denied, the host organization should notify to the DSO of the visiting diver the reason for the denial. The DSO for the visiting scientific diver has confirmed the following information:

(Date)

- _____ Written scientific diving examination
- _____ Last diving medical examination
- _____ Most recent checkout dive
- _____ Scuba regulator/equipment service/test
- _____ CPR training (Agency) _____
- _____ Oxygen administration (Agency) _____
- _____ First aid for diving _____
- _____ Date of last dive _____

Number of dives completed within previous 12 months? _____

Depth certification _____

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

Please check any pertinent specialty certifications:

- _____ Dry suit _____ Rescue _____ Blue water
- _____ Dive Computer _____ Divemaster _____ Altitude
- _____ Nitrox _____ Instructor _____ Ice/Polar
- _____ Mixed gas _____ EMT _____ Cave
- _____ Closed circuit _____ Dive Accident Management _____ Night
- _____ Saturation _____ Chamber operator _____ Other _____
- _____ Decompression _____ Lifesaving

Name of diver: _____

Emergency Information: (To notify in an emergency)

Name: _____ Relationship: _____

Telephone: (work) _____ (home) _____

Address: _____

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

(Name of AAUS Organizational Member) _____

Diving Safety Officer: _____

(Signature)

(Date)

(Print)

(Telephone, FAX, Email)

APPENDIX 9
AAUS CHECKOUT DIVE AND TRAINING EVALUATION

Certified scientific divers and Divers-In-Training from AAUS organizational members should be able to demonstrate proficiency in the following skills during checkout dives or training evaluation dives with the Dive Safety Officer or designee:

- ___ Knowledge of AAUS diving standards and regulations
- ___ Pre-dive planning, briefing, site orientation, and buddy check
- ___ Use of dive tables and/or dive computer
- ___ Equipment familiarity
- ___ Underwater signs and signals
- ___ Proper buddy contact
- ___ Monitor cylinder pressure, depth, bottom time
- ___ Swim skills:
 - ___ Surface dive to 10 ft. without scuba gear
 - ___ Demonstrate watermanship and snorkel skills
 - ___ Surface swim without swim aids (400 yd. <12min)
 - ___ Underwater swim without swim aids (25 yd. without surfacing)
 - ___ Tread water without swim aids (10 min.), or without use of hands (2 min.)
 - ___ Transport another swimmer without swim aids (25yd)
- ___ Entry and exit (pool, boat, shore)
- ___ Mask removal and clearing
- ___ Regulator removal and clearing
- ___ Surface swim with scuba; alternate between snorkel and regulator (400 yd.)
- ___ Neutral buoyancy (hover motionless in midwater)
- ___ Proper descent and ascent with B.C.
- ___ Remove and replace weight belt while submerged
- ___ Remove and replace scuba cylinder while submerged
- ___ Alternate air source breathing with and without mask (donor/receiver)
- ___ Buddy breathing with and without mask (donor/receiver)
- ___ Simulated emergency swimming ascent
- ___ Compass and underwater navigation
- ___ Simulated decompression and safety stop
- ___ Rescue:
 - ___ Self rescue techniques
 - ___ Tows of conscious and unconscious victim
 - ___ Simulated in-water rescue breathing
 - ___ Rescue of submerged non-breathing diver (including equipment removal, simulated rescue breathing, towing, and recovery to boat or shore)
 - ___ Use of emergency oxygen on breathing and non-breathing victim
 - ___ Accident management and evacuation procedures

Additional Training (optional)

Compressor/ Fill station orientation and usage

Small boat handling

APPENDIX 10
DIVING EMERGENCY MANAGEMENT PROCEDURES

Introduction

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

General Procedures

Depending on and according to the nature of the diving accident, stabilize the patient, administer 100% oxygen, contact local Emergency Medical System (EMS) for transport to medical facility, contact diving accident coordinator, as appropriate. 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.

1. Make appropriate contact with victim or rescue as required.
2. Establish (A)irway, (B)reathing, (C)irculation as required.
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.
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 organizational member.
7. Complete and submit Incident Report Form(Appendix 13) to the DCB of the organization and the AAUS (As required in Section 2.72).

List of Emergency Contact Numbers Appropriate For Dive Location:

APPENDIX 11

APPENDIX 12

GUIDELINES FOR USE OF DIVE COMPUTERS

From AAUS Dive Computer Workshop. Lang and Hamilton (Eds.). U.S.C. Sea Grant Program, Los Angeles, CA, 1989

1. Only those makes and models of dive computers specifically approved by the Diving Control Board may be used.
2. Any diver desiring the approval to use a dive computer as a means of determining decompression status must apply to the Diving Control Board, complete an appropriate practical training session and pass a written examination.
3. Each diver relying on a dive computer to plan dives and indicate or determine decompression status must have his own unit.
4. On any given dive, both divers in the buddy pair must follow the most conservative dive computer.
5. If the dive computer fails at any time during the dive, the dive must be terminated and appropriate surfacing procedures should be initiated immediately.
6. A diver should not dive for 18 hours before activating a dive computer to use it to control his diving.
7. Once the dive computer is in use, it must not be switched off until it indicates complete outgassing has occurred or 18 hours elapsed, whichever comes first.
8. When using a dive computer, non emergency ascents are to be at a rate specified for the make and model of dive computer being used.
9. Ascent rates shall not exceed 40 fsw/min in the last 60 fsw.
10. Whenever practical, divers using a dive computer should make a stop between 10 and 30 feet for 5 minutes, especially for dives below 60 fsw.
11. Only 1 dive on the dive computer in which the NDL of the tables or dive computer has been exceeded may be made in any 18 hour period.
12. Repetitive and multi-level diving procedures should start the dive, or series of dives, at the maximum planned depth, followed by subsequent dives of shallower exposures.
13. Multiple deep dives require special consideration.

APPENDIX 13

SAFE ASCENT RECOMMENDATIONS

From: AAUS BIOMECHANICS OF SAFE ASCENTS WORKSHOP.1990 , Lang and Egstrom (Eds.)

It has long been the position of the American Academy of Underwater Sciences that the ultimate responsibility for safety rests with the individual diver.

The time has come to encourage divers to slow their ascents.

1. Buoyancy compensation is a significant problem in the control of ascents.
2. Training in, and understanding of, proper ascent techniques is fundamental to safe diving practice.
3. Before certification, the diver is to demonstrate proper buoyancy, weighting and a controlled ascent, including a "hovering" stop.
4. Diver shall periodically review proper ascent techniques to maintain proficiency.
5. Ascent rates shall not exceed 60 fsw per minute.
6. A stop in the 10-30 fsw zone for 3-5 min is recommended on every dive.
7. When using a dive computer or tables, non-emergency ascents are to be at the rate specified for the system being used.
8. Each diver shall have instrumentation to monitor ascent rates.
- 9.. Divers using dry suits shall have training in their use.
10. Dry suits shall have a hands-free exhaust valve.
11. BCs shall have a reliable rapid exhaust valve which can be operated in a horizontal swimming position.
12. A buoyancy compensator is required with dry suit use for ascent control and emergency flotation.
13. Breathing 100% oxygen above water is preferred to in-water air procedures for omitted decompression.