



The University of South Florida
STANDARDS FOR SCIENTIFIC DIVING
MANUAL



Revised December 2023

This manual has been developed by the University of South Florida's Diving Safety Office in conjunction with the national standards set by the American Academy of Underwater Sciences (AAUS). It has been reviewed and accepted by the USF Diving Control Board. This manual specifies the standards for all Scientific Diving being conducted in conjunction with the University of South Florida (USF) and the Florida Institute of Oceanography (FIO). **Throughout this manual it is to be understood that when the term "USF" is used it applies to both the University of South Florida as well as the Florida Institute of Oceanography.**

These standards govern all modes of compressed gas diving both open and closed circuit. This manual satisfies the requirement specified in 29 CFR part 1910 of the OSHA regulations on commercial diving thus allowing the scientific diving being conducted under the USF Scientific Diving Program to operate under the OSHA Scientific Diving exemption.

The standards specified within this manual either meet or exceed the standards as written by the American Academy of Underwater Sciences for Scientific Diving. As an AAUS organizational member, USF has assured reciprocity for and with other AAUS member organizations.

The standards set forth within this manual present the minimum acceptable safety procedures to be implemented in all USF scientific diving operations. It must be understood that scientific diving takes place in an extremely dynamic environment. Although these standards were developed to cover most diving situations you may encounter an unanticipated situation. One must realize that you can not assume safe operation by merely following these guidelines blindly. They must be implemented with common sense, sound judgment, and a continuing concern for safety.

2023 University of South Florida Diving/ Florida Institute of Oceanography Diving Control Board Members

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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 involved with scientific diving, 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 these standards and it is the responsibility of every member within the USF Diving Safety Program as well as every member of the AAUS to see that it always reflects state of the art, safe diving practice.

ACKNOWLEDGEMENTS

The USF Scientific Diving Program would like to thank the AAUS as well as the numerous dedicated individual and AAUS organizational members for their contributions and editorial comments in the production of these standards.

Revision History

April, 1987	
October, 1990	
May, 1994	
January, 1996	
March 1999	Added Sec 7.6.1 Nitrox Diving Guidelines. Revised Appendix 7 and 11.
January 2001	Revised Section 1.23.1 DSO Qualifications. Revised Section 5.31.4 Emergency Care Training. Revised Section 6 Medical Standards. Made Sec 7.6.1 Nitrox Diving Guidelines into Section 7. Added Section 8.0 Scientific Aquarium Diving. Moved Section 7.0 to Section 9.0 Other Diving Technologies.
April 2002	Removed Appendix 7 AAUS Checkout Dive and Training Evaluation. Revised Section 5.33.3. Revised Section 4.23.2.
August 2003	Section 1.27.3 Delete reference to Appendix 9 (checkout dive). Section 1.4 Remove word “waiver”. Section 2.21 Change “supervisor” to “lead diver”. Section 2.72.2.1 Remove reference to Appendix 13, and remove Appendix 13. Replace with “at www.aaus.org” after Incident Report. Section 3.28.3 Remove Appendix 10 (dive computers). Section 5.32 Training and 100-hour requirement, eliminate “beyond the DIT level”. Section 5.32.1 Eliminate paragraph “Suggested topics include” and replace it with a list of topics for inclusion in the 100 hours. Some of these topics would be designated “R” (required). Section 4.0 Remove lead sentence “This section describes for diving”. Alter the lead sentence read as follows: “This section describes training for the non-diver applicant, previously not certified for diving, and equivalency for the certified diver.” Section 4.3 Delete this section. Section 9 Update Required Decompression (9.10) and Mixed Gas Diving (9.60) to individual sections. Appendices 9, 10, 11 and 12 Remove these and make available online as historic documents in the Virtual Office. Formatted document for consistency. Separated manual into two volumes. Volume 1 and the appendices are required for all manual and Volume 2 sections only apply when the referenced diving activity is being conducted. Volume 2 is where organizational specific information is contained.
December 2005	Section 11 Liveboating added

April 2006	Section 5.30 Deleted emergency care training prerequisite. Section 5.50 Added emergency care training requirements to Continuation of Certificate.
November 2006	Section 2.60 flying after diving rules updated to meet current DAN standards
	Section 3.20 dive computers reference changed to “appendix 8”
	Section 3.60 air quality guidelines updated to meet current CGA standards
	Section 5.30 – added words “Transect Sampling “to item #9
	Appendix 1 – Updated one medical web link
	Appendix 2 – Added the abbreviation “DO” to the MD signature line
	Appendix 6 – new LOR template
	Updated and added Appendix 8 dive computer recommendations
	Added Appendix 9 (criteria for entering diving statistics)
December 2006	Conflict of interest added 1.60
	Public Record Policy added 1.70
December 2009	Appendix 2 – revised
December 2012	Section 6 – updated (new medical panel review)
	Appendix 1 – updated
May 2013	Section 3.10- added “and serviced according to manufacturers’ recommendations”
	Section 9.1© (1)- added “omitted decompression”
	Section 9.1© (7)- added “qualified” to DSO’s designee
	Section 9.30 (k)- replaced “mixed gas” with “decompression”
	Section 4.0 – removed specific requirements for Entry-Level Training. Adopted WRSTC/ISO standards by reference.
	Section 5.0- merged requirements for Entry-Level Diver Training with Scientific Diver Training
	Formatted document for consistency
August 2016	Section 12 – Revised
March 2019	AAUS BOD approved revisions DEC 2018 avail at AAUS Dive Standards
September 2019	Appendix 8- Updated Incident Report

MISSION STATEMENT

The mission of the University of South Florida and the Florida Institute of Oceanography's Scientific Diving Program is to support excellence in underwater research. To this end we must develop, review and implement standards for safe scientific diving; educate and train the membership in the most current safe scientific diving practices; and to represent the scientific diving interests of the membership before administrations of the University of South Florida, the Florida Institute of Oceanography as well as other organizations and government agencies.

PROGRAM PURPOSE

The ultimate goal of the Diving Safety Program is **safety**. Safety for the diver, the diver's buddy, the project, the project's members, the University or Institute, and the State University System. These standards are based on accepted safe diving practices. Failure to adhere to the standards outlined in this manual may result in the exclusion of medical benefits, which would normally be provided to the complying diver. The Scientific Diving Exemption is granted by the federal Occupational Safety and Health Administration. Failure to adhere to the standards set forth in this manual may jeopardize the entire Diving Safety Program.

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Volume 1

Sections 1.00 through 5.00

SECTION 1.00 GENERAL POLICY

1.10 Scientific Diving Standards

Purpose

The purpose of these USF 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 that will allow a working reciprocity between other research facilities specifically organizational members of the American Academy of Underwater Sciences (AAUS). Fulfillment of the purposes shall be consistent with the furtherance of research and safety. **Failure to follow these standards may jeopardize the use of the data collected during non-compliant Scientific Dives as determined by the USF DCB.**

This manual adheres to the minimal standards required for the establishment of the American Academy of Underwater Sciences (AAUS) recognized scientific diving programs. It outlines the procedures for the conduct of these programs as well as the basic regulations and procedures for safety in scientific diving operations. It also establishes a framework for reciprocity between any AAUS organizational members that adhere to these minimum standards.

This manual was developed and written by the USF Diving Safety Office in conjunction with the current AAUS standards. It is a dynamic work in progress. The AAUS manual came to its present form by compiling the policies set forth in the diving manuals of several universities as well as both private and governmental scientific diving programs. These programs share a common heritage with the scientific diving program at the Scripps Institution of Oceanography (SIO). Adherence to the SIO standards has proven both feasible and effective in protecting the health and safety of scientific divers since 1954.

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

This manual contains additional standards that extend this document beyond the standards outlined in the core AAUS *Manual*. This step was taken to allow for local environments, specialized procedures and advanced diving technologies.

This manual has been thoroughly reviewed and approved by the majority of the USF Diving Control Board.

Scientific Diving Definition

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

“Diving performed solely as a necessary part of a scientific, research, or educational activity by employees whose sole purpose for diving is to perform scientific research tasks. Scientific diving does not include performing any tasks usually associated with commercial diving such as: Placing or removing heavy objects underwater; inspection of pipelines and similar objects; construction; demolition; cutting or welding; or the use of explosives.”

Scientific Diving Exemption

OSHA has granted an exemption for scientific diving from commercial diving regulations under the following guidelines (Appendix B to 29CFR1910 Subpart T):

- a) The Diving Control Board consists of a majority of active scientific divers and has autonomous and absolute authority over the scientific diving program's operation.
- b) The purpose of the project using scientific diving is the advancement of science; therefore, information and data resulting from the project are non-proprietary.
- c) The tasks of a scientific diver are those of an observer and data gatherer. Construction and trouble-shooting tasks traditionally associated with commercial diving are not included within scientific diving.
- d) Scientific divers, based on the nature of their activities, must use scientific expertise in studying the underwater environment and therefore, are scientists or scientists-in-training.
- e) In addition, the scientific diving program shall contain at least the following elements (29CFR1910.401):
 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.
 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.

Review of Standards

As part of the USF annual report to the AAUS, any recommendations for modifications to this AAUS *Manual* shall be submitted to the AAUS for consideration.

1.20 Operational Control

USF / FIO Auspices Defined

For the purposes of this *Manual* the auspices of the USF / FIO includes any scientific diving operation in which USF / FIO 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 USF / FIO 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 for USF or are diving as members of an organization recognized by the AAUS.

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

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

Diving Safety Officer

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

a) Qualifications

1. Must be appointed by Office of Research, Research Integrity and Compliance.
2. Must be an active scuba instructor from an internationally recognized certifying agency.
3. Must qualify as a Full Voting Member of AAUS as defined by AAUS Bylaws:
 - “(a) Holds a diving certification from a recognized national certifying agency or equivalent, and
 - (b) Has engaged in sustained or successive scientific diving activities during the past two years, or
 - (c) Has completed a course in scientific diving that meets the requirements as specified by the most current edition of the AAUS Standards for Scientific Diving.”
4. Must 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.
5. Shall meet all additional requirements as specified by the USF position description as it pertains to this position.

b) Duties and Responsibilities

1. Shall be responsible, through the DCB as well as the Research Integrity and Compliance, for the conduct of the scientific diving program for USF. 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 standard and all relevant regulations of the USF Scientific Diving Program, rests with the Diving Safety Officer.
2. May permit portions of this program to be carried out by the USF Assistant Diving Safety Officer or another qualified delegate, although the Diving Safety Officer may not delegate responsibility for the safe conduct of the local diving program.
3. Must 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.
4. Must suspend diving operations considered to be unsafe or unwise.

Diving Control Board (DCB)

All DCB members must follow the Conflict of Interest policy as outlined in section [1.60](#)

- a) The Diving Control Board (DCB) must consist of a majority of active scientific divers as specified by the U.S. Code of Federal Regulations (CFR). Voting members shall include the Diving Safety Officer, the Chairperson of the DCB, and should include representatives from the colleges and/or departments which utilize diving within their program. Additional members may be invited, upon consensus from the DCB, to join

the DCB as a representative for their college, department or possibly affiliated groups. In addition, the DCB will also have non-voting Student Representatives. The task of the Student Representative is to voice the opinions of the Student Scientific Divers. One Student Representative will be chosen from each campus on which Scientific Diving is being conducted. These Student Representatives must be Scientific Divers currently enrolled in the USF Scientific Diving Program.

- b) Has autonomous and absolute authority over the scientific diving program's operation.
- c) Shall have the ability to approve and monitor diving projects.
- d) Shall review and revise the diving safety manual.
- e) Shall assure compliance with this "Standards for Scientific Diving" manual.
- f) Shall certify the depths to which a diver has been trained.
- g) Shall take disciplinary action for unsafe practices.
- h) Shall assure adherence to the buddy system for scuba diving.
- i) Shall act as the official representative of USF in matters concerning the scientific diving program.
- j) Shall act as a board of appeal to consider diver-related problems.
- k) Shall recommend the issue, re-issue, or the revocation of diving certifications.
- l) Shall recommend changes in policy and amendments to the USF diving safety manual as the need arises.
- m) Shall establish and/or approve training programs through which the applicants for certification can satisfy the requirements for the "Standards for Scientific Diving" manual.
- n) Shall suspend diving programs that are considered to be unsafe or unwise.
- o) Shall establish criteria for equipment selection and use when pertinent.
- p) Shall recommend new equipment or techniques when pertinent.
- q) Shall establish and/or approve facilities for the inspection and maintenance of diving and associated equipment.
- r) Shall ensure that the USF air station(s) meet air quality standards as described in Section [3.60](#).
- s) Shall periodically review the Diving Safety Officer's performance and program.
- t) Shall sit as a board of investigation to inquire into the nature and cause of diving accidents or violations of the USF "Standards for Scientific Diving" manual.
- u) The DCB may delegate operational oversight for portions of the program to the DSO; however, the DCB may not abdicate responsibility for the safe conduct of the diving program.

Instructional Personnel

- a) Qualifications - All personnel involved in diving instruction under the auspices of

USF Scientific Diving program shall be qualified for the type of instruction they will be administering.

- b) Selection - Instructional personnel will be selected by the DSO, Assistant DSO or the Division of Research Integrity and Compliance, who will solicit the advice of the DCB in conducting preliminary screening of applicants for instructional positions.

Lead Diver

For each dive, one individual shall be designated by the Diving Safety Office as the Lead Diver who shall be at the dive location during the diving operation. The Lead Diver shall be responsible for:

- a) Coordination with other known activities in the vicinity that are likely to interfere with diving operations.
- b) Ensuring all dive team members possess current certification and are qualified for the type of diving necessary for the project.
- c) Planning dives in accordance with [Section 2.0](#)
- d) Ensuring the safety and emergency equipment is in working order and at the dive site.
- e) Briefing dive team members on:
 - 1. Dive objectives.
 - 2. Unusual hazards or environmental conditions likely to affect the safety of the diving operation.
 - 3. Modifications to diving or emergency procedures necessitated by the specific diving operation.
 - 4. Suspending diving operations if in their opinion conditions are not safe.
 - 5. Reporting to the DSO, Assistant DSO or DCB any physical problems or adverse physiological effects including symptoms of pressure-related injuries.
- f) Ensuring all the proper post project paperwork is completed and submitted to the Diving Safety Office.

Reciprocity and Visiting Scientific Diver

- a) When USF is engaged with one or more AAUS Organizational Members jointly in diving activities, or engaged jointly in the use of diving resources, then a single DCB must be designated to govern the joint dive project.
- b) A Scientific Diver from another recognized research facility shall apply for permission to dive under the auspices of the USF Scientific Diving Program by submitting to the Diving Safety Officer of USF a document containing all the information described in [Appendix 6](#), signed by the Diving Safety Officer or Chairperson of the home Diving Control Board.
- c) A visiting Scientific Diver may be asked to demonstrate their knowledge and skills for the planned dive.
- d) If USF denies a visiting Scientific Diver permission to dive, the USF DSO or the USF Diving Control Board shall notify the visiting Scientific Diver and their Diving Control Board with an explanation of all reasons for the denial.

Waiver of Requirements

The USF DSO may grant a waiver for specific requirements of training, examinations, depth certification, and minimum activity to maintain certification. AAUS medical standards may not be waived.

1.30 Consequence of Violation of Regulations by USF Scientific Divers

Failure to comply with the regulations of the USF Standards for Scientific Diving may be cause for the revocation or restriction of the diver's scientific diving certificate by action of the USF Diving Control Board. It may also invalidate any data collected on any non-compliant dives.

1.40 Consequences of Violation of AAUS Regulations by the USF Scientific Diving Program

Failure to comply with this *Manual* set by the AAUS may be cause for the revocation or restriction of USF Scientific Diving Program's recognition by AAUS.

1.50 Record Maintenance

The Diving Safety Officer, Assistant Diving Safety Officer or designee shall maintain permanent records for each Scientific Diver certified. The file shall include evidence of certification level, log sheets, results of current physical examination, reports of disciplinary actions by the USF Diving Control Board, and other pertinent information deemed necessary.

Availability of Records:

- a) If complete medical records are kept the records shall be available to the attending physician of a diver or former diver when released in writing by the diver.
- b) Records and documents required by this standard shall be retained by the USF Diving Safety Office for the following period:
 1. Physician's written reports of medical examinations for dive team members - 5 years from date of expiration.
 2. The USF "Standards for Scientific Diving" manual – most current document only.
 3. Records of dive - 1 year, except for 5 years where there has been an incident of pressure-related injury.
 4. Pressure-related injury assessment - 5 years.
 5. Equipment inspection and testing records - current entry or tag, or until equipment is withdrawn from service.

1.60 Conflict of Interest

No member of the USF DCB may participate in the review, discussion, or vote of a project or activity in which he/she has a conflicting interest. The USF DCB member will be requested to leave the room prior to the discussion, review and vote of the project and cannot be counted toward the quorum. The excused member can be recalled to provide information that is requested by the USF DCB.

The USF DCB Chairperson will ask USF DCB members at the beginning of each meeting if any have a conflicting interest in the business to be conducted that day. In addition, the USF DCB administrative support staff of Research Integrity & Compliance will provide the USF DCB Chairperson with a list of USF DCB members who are identified as participants in projects/activities being reviewed or discussed during the convened meeting. The USF DCB Chairperson will ask all members with conflicting interests to leave at the appropriate time during the proceedings.

1.70 Public Records

University research records are subject to both federal and state laws. Requests for information under the federal Freedom of Information Act (FOIA) should be made through Research Integrity & Compliance. Requests for information under the Florida Public Records Law should be made to the USF General Counsel.

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 USF scientific diving program unless they are authorized issued pursuant to the provisions of this *Manual*.

2.20 Pre-Dive Procedures

Dive Plans

Dives should be planned around the competency of the least experienced diver. Before conducting any diving operations under the auspices of the USF, the lead diver for a proposed operation must complete and submit a dive plan on the “Dive Plan Submitted Form” found in the appendix of this manual. This dive plan should include the following:

- a) Divers qualifications
 1. The type of certification held by each diver.
 2. Depth limitation
- b) Safety Diver
 1. Each dive shall have a safety diver standing by with full gear setup ready to get into the water in the event of an emergency.
 2. Exceptions to this policy will reside with the DSO or the DSO’s designee.
- c) Emergency plan ([Appendix 7](#)) with the following information:
 1. Name, telephone number, and relationship of person to be contacted for each diver in the event of an emergency.
 2. The procedure necessary to activate the EMS in the area.
 3. Diver’s Alert Network’s medical emergency contact number. To be used to locate the nearest recompression chamber should it be necessary.
 4. Available means of transport.
- d) Number of proposed dives.
- e) Location(s) of proposed dives.
- f) Estimated depth(s) and bottom time(s) anticipated.
 1. If changes are made to the dive plan during the expedition, the Lead Diver MUST recalculate the diving profiles for every diver continuing to dive for the remaining portion of the expedition. These changes must be reviewed by at least one other dive team member and then presented to the dive team.
- g) Decompression status and repetitive dive plans, if required.
- h) Proposed work, equipment, and work platforms to be employed.
- i) Any hazardous conditions anticipated.

Pre-dive Safety Checks

- a) Diver’s Responsibility:

1. Scientific divers shall conduct a functional check of their diving equipment in the presence of the diving buddy or tender.
 2. It is the diver's responsibility and duty to refuse to dive if, in their judgment, conditions are unfavorable, or if they would be violating the precepts of their training or the standards set forth in the USF "Standards for Scientific Diving Manual".
 3. No dive team member shall be required to be exposed to hyperbaric conditions against their will.
 4. No dive team member shall be permitted to dive for the duration of any known condition(s), which is likely to adversely affect the safety and health of the diver or other dive members.
- b) Equipment Evaluations
1. Divers shall ensure that their equipment is in proper working order and that the equipment is suitable for the type of diving operation.
 2. Each diver shall have the capability of achieving and maintaining positive buoyancy.
- c) Site Evaluation - Environmental conditions at the site will be evaluated.

Pre-dive Briefings

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

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

2.30 Diving Procedures

Solo Diving Prohibition

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

Refusal to Dive

- a) The decision to dive is that of the diver. A diver may refuse to dive, without fear of penalty or repercussion, whenever they feel it is unsafe for them to make the dive.
- b) 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 their judgment, conditions are unsafe or unfavorable, or if they would be violating the precepts of their training or the regulations in these *Manual*.

Decompression Management

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

Termination of the Dive

- a) It is the responsibility of the diver to terminate the dive, without fear of penalty or repercussion, 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 return to the surface. This would include any required decompression time, or to safely reach an additional air source at the decompression station.

Emergencies and Deviations from Regulations

Any diver may deviate from the requirements of these standards to the extent necessary to prevent or minimize a situation that is likely to cause death, serious physical harm, or major environmental damage. A written report of such actions must be submitted to the Diving Safety Office explaining the circumstances and justifications.

2.40 Post-Dive Procedures

Post-Dive Safety Checks

- a) After the completion of a dive each diver shall report any physical problems, symptoms of decompression sickness, or equipment malfunctions.
- b) When diving outside of the no-decompression limits, the divers should remain awake for at least 1 hour after diving, and in the company of a dive team member who is prepared to initiate emergency medical action if necessary.

2.50 Emergency Procedures

USF has developed an Emergency Management Plan which is outlined in [Appendix 7](#).

2.60 Flying After Diving or Ascending to Altitude Over 1000 feet

- a) Following a Single No-Decompression Dive: The divers should have a minimum preflight surface interval of 12 hours.
- c) Following Multiple Dives per Day or Multiple Days of Diving: The divers should have a minimum preflight surface interval of 18 hours.
- d) Following Dives Requiring Decompression Stops: The divers should have a minimum preflight surface interval of 24 hours.
- e) Before ascending to Altitude above (1000 feet) by Land Transport: The divers should follow the appropriate guideline for preflight surface intervals unless the decompression procedure used has accounted for the increase in elevation.

2.70 Record Keeping Requirements

Personal Diving Log

Each Scientific Diver or Diver-in-Training shall log every dive made under the auspices of the USF Scientific Diving program, and is encouraged to log all other dives. A Scientific Diving Log in an Excel spreadsheet format is available on the Scientific Diving website. This is the preferred format for submitting your logged dives. The spreadsheet will categorize and sum your dives for the entire year. Electronic submission of the spreadsheet should be done on a monthly basis or at the completion of a project. A record of the diver's dives will be placed in the diver's permanent file.

Required Incident Reporting

All diving incidents, regardless of severity, shall be reported to the USF Diving Safety Office. Serious incidents MUST be reported immediately via telephone or email. Minor incidents can be reported by filling out the "Post Project Report Form". It is required that this form be completed on a daily basis during any project. The "Post Project Report Form" is available for download from the USF Scientific Diving Web site as well as [Appendix 13](#). In a case of injuries of a more severe nature a detailed follow-up report will also be requested ([Appendix 8](#)). The USF Diving Safety Office will then follow all the appropriate procedures for incident reporting, including those required by the AAUS. The report must specify the circumstances of the incident and the extent of any injuries or illnesses.

Additional information must meet the following reporting requirements:

- a) USF or any research organization(s) participating with USF on a project shall record and report occupational injuries and illnesses in accordance with requirements of both the U.S. Labor Code and USF Office of Environmental Health and Safety.
- b) Any research organization(s) utilizing any USF or FIO facility, including but not limited to any or all labs or vessels, shall record and report occupational injuries and illnesses in accordance with requirements U.S. Labor Code and USF Office of Environmental Health and Safety .
- c) If pressure-related injuries are suspected, or if symptoms are evident, the following additional information shall be recorded and retained by USF, with the record of the dive, for a period of 5 years:
 1. Complete USF Incident Report (available for download from the Environmental Health and Safety website).
 2. Written descriptive report to include ([Appendix 8](#)):
 - Name, address, phone numbers of the principal parties involved.
 - Summary of experience of divers involved.
 - Location, description of dive site, and description of conditions that led up to incident.
 - The circumstances of the incident and the extent of any injuries or illnesses.
 - Description of symptoms, including depth and time of onset.
 - Description and results of treatment.
 - Disposition of case.
 - Recommendations to avoid repetition of incident.

- d) USF shall investigate and document any incident of pressure-related injury and prepare a report that is to be forwarded to AAUS during the annual reporting cycle ([Appendix 9](#)). This report must first be reviewed and released by the USF Diving Safety Office and then the USF Diving Control Board.

SECTION 3.00 DIVING EQUIPMENT

3.10 General Policy

All equipment shall meet standards as determined by the USF Diving Safety Officer and/or the USF Diving Control Board. All equipment shall be regularly examined by the person using them and serviced according to manufacturer recommendations. Equipment that is subjected to extreme usage under adverse conditions should require more frequent testing and maintenance.

3.20 Equipment

Regulators and Gauges

- a) Scuba regulators and gauges must be inspected and tested prior to each use and serviced, at a minimum, according to manufacturer's recommendations.
- b) Standard open circuit (OC) equipment must include:
 1. A first stage
 2. Primary 2nd stage
 3. Back up 2nd stage
 4. Submersible Pressure Gauge (SPG)
 5. Inflator hose for buoyancy compensation device (BCD)
- c) A full face mask may be used in place of the primary 2nd stage according to manufacturer's recommendations. Prior approval by the USF Diving Safety Office is required.

Breathing Masks and Helmets

Breathing masks and helmets shall have:

- a) A non-return valve at the attachment point between helmet or mask and hose, which shall close readily and positively.
- b) An exhaust valve.
- c) A minimum ventilation rate capable of maintaining the diver at the depth to which they are diving.

Scuba Cylinders

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

Backpacks

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

Buoyancy Compensation Devices (BCD)

- a) Each diver shall have the capability of achieving and maintaining neutral buoyancy underwater and positive buoyancy on the surface.
- b) Buoyancy compensators, dry suits, or other variable volume buoyancy compensation devices shall be equipped with an exhaust valve.
- c) Buoyancy compensators, dry suits, or other variable volume buoyancy compensation devices must not be used as a lifting device in lieu of lift bags.
- d) These devices shall be functionally inspected and tested at intervals not to exceed 12 months.

Timing and Depth Devices

Both members of the buddy team must have an underwater timing device, and a depth indicator.

Determination of Decompression Status: Dive Tables, Dive Computers

- a) A set of diving tables, approved by the USF Diving Safety Office, must be available at the dive location.
- b) Dive computers may be utilized in place of diving tables, and must be approved by the USF Diving Control Board.
- c) If a dive computer is used, the diver must use the same computer for repetitive dives or revert back to dive tables.
- d) In an aquarium or other manmade structure of a known maximum obtainable depth:
 1. A depth indicator is not required, except when a diver's decompression status must be taken into consideration.
 2. The maximum obtainable depth must be used as the diving depth.
 3. Only one buddy must be equipped with a timing device.

3.30 Auxiliary Equipment

Hand held underwater power tools and electrical 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

First aid supplies

A first aid kit and emergency oxygen shall be available.

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.

Compressor Systems

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

- a) 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.
- 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.

3.50 Equipment Maintenance

Record Keeping

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:

- a) Regulators
- b) Submersible pressure gauges
- c) Depth gauges
- d) Scuba cylinders
- e) Cylinder valves
- f) Diving helmets
- g) Submersible breathing masks
- h) Compressors
- i) Gas control panels
- j) Air storage cylinders
- k) Air filtration systems
- l) Analytical instruments
- m) Buoyancy control devices
- n) Dry suits

Compressor Operation and Air Test Records

- a) Gas analyses and air tests shall be performed on each USF/ FIO 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 shall be entered in a formal log and be maintained.
- b) 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).

CGA Grade E (1)	
Component	Maximum
Oxygen	20 - 22%
Carbon Monoxide	10 ppm
Carbon Dioxide	1000 ppm
Condensed Hydrocarbons	5 mg/m ³
Total Hydrocarbons as Methane	25 ppm
Water, ppm	(2)
Objectionable Odors	None

1. Compressed Gas Association Pamphlet G-7 1989, specifies Grade E as the minimum grade to be used for sports diving to 130 feet.
2. 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 USF, every effort should be made to verify breathing gas meets the requirements of this standard. If CGA Grade E gas is not verifiable, the DCB must develop a protocol to mitigate risk to the diver.

SECTION 4.00 SCIENTIFIC DIVER CERTIFICATION AND AUTHORIZATIONS

This section describes the training and performance standards for USF scientific divers and represent the minimum required level of knowledge and skills presented in a generalized format.

4.10 General Policy

AAUS, whose standards are the basis for the USF “Standards for Scientific Diving Manual”, requires that no person shall engage in scientific diving unless that person is authorized by the USF Diving Safety Office to the provisions of these standards. Only a person diving under the auspices of the USF or FIO that subscribes to the practices of AAUS is eligible for a scientific diver certification.

4.20 Requirements for Scientific Diver Certification

Submission of documents and participation in aptitude examinations does not automatically result in certification. The applicant must convince the USF Diving Safety Officer and/or the members of the USF DCB that they are sufficiently skilled and proficient to be certified. This skill will be acknowledged by the signature of the USF Diving Safety Officer. Any applicant who does not possess the necessary judgment, under diving conditions, for the safety of the diver and their partner, may be denied USF scientific diving privileges.

4.30 Prerequisites

Entry Level Certification

The candidate must, at minimum, show documented proof of Diver Certification or equivalent from an internationally recognized training agency or scientific diving program.

Administrative

The candidate must complete all administrative and legal documentation required by USF. The following are the minimum documentation and examinations required:

- a) Application/Waiver - Application for admittance into the USF Scientific Diving Program shall be made to the Diving Safety Office on the forms prescribed. These forms are available both on the USF Scientific Diving web site as well as in the appendix of this manual. ([Appendix 12](#))
- b) Medical approval. Each diver applying for admittance into the USF Scientific Diver program shall submit a “Medical Evaluation of Fitness for Scuba Diving Report” signed by a licensed physician, based on an approved medical examination, attesting to the applicant’s fitness for diving ([Section 5.00](#) and [Appendices 1 - 4](#)). AAUS medical standards may not be waived.
- c) Completion of all the Scientific Diver-In-Training requirements.
- d) Diving Insurance – all divers must have proof of insurance. If a diver is a student in any capacity at USF/FIO they are required to have Diving Accident Insurance. Typical suppliers include but are not limited to the Divers Alert Network (DAN), the National Association of Underwater Instructors (NAUI) and the Professional Association of Dive Instructors (PADI).

Medical Examination

The candidate must be medically qualified for diving as described in [Section 5.0](#) and [Appendices 1 - 4](#) of this Manual. AAUS medical standards may not be waived.

Swimming Evaluation

The candidate shall successfully perform the following tests, or equivalent, in the presence of the Diving Safety Officer or designee. All tests are to be performed without swim aids.

- a) Swim underwater without swim aids for a distance of 25 yards without surfacing.
- b) Swim 400 yards in less than 12 minutes.
- c) Tread water for 10 minutes, or 2 minutes without the use of hands.
- d) Transport a passive person of equal size a distance of 25 yards in the water.

4.40 Training

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

When a diver's resume provides clear evidence of significant scientific diving experience, the diver can be given credit for meeting portions of the 100 hour course requirements. The DCB will identify specific overlap between on-the-job training, previous scientific diving training/experience and course requirements, and then determine how potential deficiencies may be resolved. A candidate cannot "test-out" when they have no previous experience in scientific diving.

Any candidate who does not convince the DCB, through the DSO, that they possess the necessary judgment, under diving conditions, for the safety of the diver and his/her buddy, may be denied USF 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	Specialized Environments and Conditions <ul style="list-style-type: none">• Blue Water Diving• Altitude

<ul style="list-style-type: none"> • Mapping • Coring • Photography • Tagging • Collecting • Animal Handling • Archaeology • Common Biota • Organism Identification • Behavior • Ecology • Site Selection, Location, and Re-location • Specialized Data Gathering Equipment 	<ul style="list-style-type: none"> • 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
HazMat Training <ul style="list-style-type: none"> • HP Cylinders 	<ul style="list-style-type: none"> • Chemical Hygiene, Laboratory Safety (Use of Chemicals)
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)	Other Topics and Techniques as Determined by the DCB
Dive Physiology (Beyond entry level scuba)	
Dive Environments	
Decompression Theory and its Application	

Practical Training / Skill Development	
Confined Water	<p>At the completion of training, the trainee must satisfy the DSO or designee of their ability to perform the following, as a minimum, in a pool or in sheltered water:</p> <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 recipient, with and without a face mask • 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

	<ul style="list-style-type: none"> • Demonstrate acceptable watermanship skills for anticipated scientific diving conditions
Open Water Skills	<p>The trainee must satisfy the DSO, or 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 7
	<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) must 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 USF 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 ^^ Evaluated on all dives ^ Evaluated at some point during the training cycle</p>

Examinations	
Equipment	The trainee will be subject to examination/review of: <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	The trainee must pass a written examination reviewed and approved by the OM DCB that demonstrates knowledge of at least the following: <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)

4.50 Diver Certification and Authorizations

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

Diver-In-Training (DIT) Authorization

This is an authorization to dive, usable only while it is current and for the purpose intended. This authorization signifies that a diver has completed and been certified as at least an entry level diver through an internationally recognized certifying agency and has the knowledge skills and experience necessary to commence and continue training as a scientific diver under supervision, as approved by the DCB. DIT status must only be used when the diver is on his/her way to becoming certified as a scientific diver. While it is recommended for DIT's to have hands-on scientific diver experience during their training, the DIT status is intended to be a temporary authorization, not a substitute for Scientific Diver Certification.

- a) All divers entering the USF Scientific Diving Program enter as a Diver-In-training
- b) A diver will remain a Diver-In-Training until ALL requirements are met as outlined in [Section 4.0](#).
- c) A diver will revert back to a Diver-In-Training if and when any of the requirements of [Section 4.0](#) are no longer met.

- d) A Diver-In-Training must be paired with a full status Scientific Diver for all dives.

Scientific Diver Certification

This is a permit to dive, usable only while it is current and for the purpose intended. Certification signifies a diver has completed all requirements in [Section 4.0](#) and is certified by USF to engage in scientific diving, as approved by the DCB through the DSO. Submission of documents and participation in aptitude examinations does not automatically result in certification. To be certified, the applicant must demonstrate to the DCB, through the DSO, that s/he is sufficiently skilled and proficient, and possess the necessary judgement for their safety and/or that of the dive team. Scientific Diver Certification is only active when required authorizations are in place and current.

Temporary Diver Authorization

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

4.60 Depth Authorizations

Depth Ratings and Progression to Next Depth Level

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

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

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

- a) Authorization to 30 Foot Depth - Initial Diver-In-Training depth authorization, approved upon the successful completion of training listed in [Section 4.0](#). Cumulative minimum supervised dives: 12.
- b) 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.

- c) Authorization to 100 Foot Depth - A diver holding a 60-foot authorization may be authorized to a depth of 100 feet after successfully completing and logging 6 supervised dives to depths between 61 and 100 feet under supervision of a dive buddy authorized by the DCB. The diver must also demonstrate proficiency in the use of the appropriate decompression profiling method. Cumulative minimum supervised dives: 30.
- d) Authorization to 130 Foot Depth - A diver holding a 100-foot authorization may be authorized to a depth of 130 feet after successfully completing and logging 6 supervised dives to depths between 100 and 130 feet under supervision of a dive buddy authorized by the DCB. The diver must also demonstrate proficiency in the use of the appropriate decompression profiling method. Cumulative minimum supervised dives: 36.
- e) Authorization to 150 Foot Depth - A diver holding a 130-foot authorization may be authorized to a depth of 150 feet after successfully completing and logging 6 supervised dives to depths between 130 and 150 feet under supervision of a dive buddy authorized by the DCB. The diver must also demonstrate knowledge of the special problems of deep diving and of special safety requirements. Cumulative minimum supervised dives: 42.
- f) Authorization to 190 Foot Depth - A diver holding a 150-foot authorization may be authorized to a depth of 190 feet after successfully completing and logging 6 dives to depths between 150 and 190 feet under supervision of a dive buddy authorized by the DCB. The diver must also demonstrate knowledge of the special problems of deep diving and of special safety requirements. Cumulative minimum supervised dives: 48.

Diving on air is not permitted beyond a depth of 190 feet. The Diving Safety Office may require that any dives conducted to depths between 150-190 fsw utilize mixed gas technology depending on the circumstances of the dive. Dives beyond 190 feet require the use of mixed gas.

- g) Authorization to 250 Foot Depth - A diver holding a 190-foot authorization may be authorized to a depth of 250 feet after successfully completing and logging 6 supervised dives to depths between 190 and 250 feet under supervision of a dive buddy authorized by the DCB. The diver must also demonstrate knowledge of the special problems of deep diving and of special safety requirements.
- h) Authorization to 300 Foot Depth - A diver holding a 250-foot authorization may be authorized to a depth of 300 feet after successfully completing and logging 6 supervised dives to depths between 200 and 250 feet under supervision of dive buddy authorized by the DCB. The diver must also demonstrate knowledge of the special problems of deep diving and of special safety requirements.
- i) Authorizations deeper than 300 Feet – Depth authorizations deeper than 300 feet progress in 50-foot depth/6 dive increments. A diver holding a 300 foot, or deeper authorization may be authorized to the next depth authorization increment after successfully completing and logging 6 supervised dives under supervision of dive buddy authorized by the DCB. The diver must also demonstrate knowledge of the special problems of deep diving and of special safety requirements.

4.70 Maintaining Active Status

Minimum Activity to Maintain Authorizations

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 deeper. Failure to meet these requirements may result in the revocation or restriction of authorization. At the very least the diver will drop to a "Diver-in-training" certification requiring the diver to be buddied with a fully certified "Scientific Diver".

Re-qualification of Depth Certificate

Once the initial certification requirements of [Section 4.0](#) are met, divers whose depth certification has lapsed due to lack of activity may be re-qualified by procedures determined by the USF Diving Safety Office determined on a case by case basis.

Medical Examination

All certified scientific divers shall pass a medical examination at the intervals specified in [Section 5.0](#). After each major illness or injury, as described in [Section 5.1](#), a certified scientific diver shall receive clearance to return to diving from a physician before resuming diving activities.

Emergency Care Training.

The scientific diver must provide proof of training in the following:

- Adult CPR (must be current).
- Emergency oxygen administration (must be current)
- First aid for diving accidents (must be current)

4.80 Revocation of Certification/Authorization

An individual's scientific diver certification may be restricted or revoked for cause by the USF Diving Safety Officer or the USF DCB. Authorizations associated with an individual's scientific diver certification may be restricted or suspended for cause by the USF Diving Safety Officer or the USF DCB. Violations of regulations set forth in this manual, or other governmental subdivisions not in conflict with this manual, or demonstration of poor judgement, may be considered cause. The DSO or designee shall inform the diver in writing of the reason(s) for revocation. Restrictions or suspensions issued by the DSO may be rescinded by the DSO; these issues will be reported to and reviewed by the DCB, and the outcomes or actions resulting from this review will be documented in the diver's file. The diver will be given the opportunity to present their case in writing to the DCB for reconsideration. All such written statements and requests, as identified in this section, are formal documents, and therefore part of the diver's file.

4.90 Recertification/Reauthorization

If a diver's certificate expires or is revoked, they may be recertified/reauthorized after complying with such conditions as the USF Diving Safety Officer or the USF DCB may impose. The diver shall be given an opportunity to present their case to the USF DCB before conditions for re-certification/reauthorization are stipulated.

SECTION 5.00 MEDICAL STANDARDS

5.10 Medical Requirements

General

- a) The USF Diving Safety Office shall determine that divers have passed a current diving physical examination and have been declared by the examining physician to be medically qualified to dive. The USF Diving Safety Office has received the results of that examination, and those results have been reviewed and found satisfactory by the USF Diving Safety Office.
- b) All medical evaluations required by this *Manual* 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 for which restrictions from diving are generally recommended ([Appendix 1](#)).

5.20 Frequency of Medical Evaluations

Medical evaluation shall be completed:

- a) **Before age 40-** Before a diver may begin diving, unless an equivalent initial medical evaluation has been given within the preceding 5 years. Medical shall be completed at 5 year intervals.
- b) **After age 40 before age 60-** Before a diver may begin diving, unless an equivalent initial medical evaluation has been given within the preceding 3 years. Medical shall be completed at 3 year intervals.
- c) **After age 60-** Before a diver may begin diving, unless an equivalent initial medical evaluation has been given within the preceding 2 years. Medical shall be completed at 3 year intervals.
- d) Clearance to return to diving must be obtained from a healthcare provider following any major injury or illness, any condition requiring chronic medication, or any condition listed in [Appendix 1](#). If the injury or illness is pressure related, then the clearance to return to diving must come from a physician trained in diving medicine.

5.30 Information Provided to Examining Physician

The USF Diving Safety Office shall provide a copy of the medical evaluation requirements of this manual to the applicant to give to the examining physician ([Appendices 1, 2, and 3](#)).

5.40 Content of Medical Evaluations

Medical examinations conducted initially and at the intervals specified in [Section 5.20](#) shall consist of the following:

- a) Applicant agreement for release of medical information to the Diving Safety Officer and the DCB ([Appendix 2b](#)).
- b) Medical history ([Appendix 3](#)).
- c) Medical Evaluation of Fitness for Scuba Diving Report (Required tests listed in [Appendix 2](#)).

5.50 Physician's Written Report

- a) After any medical evaluation relating to the individual's fitness to dive, the USF Diving Safety Office shall obtain a written report prepared and signed by the examining physician that shall contain the examining physician's opinion of the individual's fitness to dive, including any recommended restrictions or limitations.
- b) The Medical Evaluation will be reviewed by the DCB should the DSO deem necessary. The diver's record and authorizations will be updated accordingly.
- c) The USF Diving Safety Office shall make a copy of the physician's written report available to the individual.

Volume 2

Sections 6.00 through 14.00

SECTION 6.00 NITROX DIVING GUIDELINES

The following guidelines address the use of nitrox by scientific divers while under the auspices of USF or another AAUS Organizational Member. Nitrox is defined for these guidelines as breathing mixtures composed predominately of nitrogen and oxygen, most commonly produced by the addition of oxygen or the removal of nitrogen from air.

6.10 Requirements for Nitrox Authorization

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

- **Prerequisites**

Only a certified Scientific Diver or DIT diving under the auspices of an OM is eligible for authorization to use nitrox.

Application for authorization to use nitrox must be made to the DCB. Submission of documents and participation in aptitude examinations does not automatically result in authorization to use nitrox. The applicant must convince the DCB through the DSO that they are sufficiently knowledgeable, skilled and proficient in the theory and use of nitrox for diving.

- **Training**

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

- 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 enriched air nitrox (EAN) diving". ISO 11107:2009 - International Organization for Standardization (ISO), www.iso.org

- **Practical Evaluation**

- Oxygen analysis of nitrox mixtures.
- Determination of MOD, oxygen partial pressure exposure, and oxygen toxicity time limits, for various nitrox mixtures at various depths.
- 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.
- Nitrox dive computer use may be included, as approved by the DCB.
- A minimum of two supervised open water dives using nitrox is required for authorization.

- **Written Evaluation**
 - Function, care, use, and maintenance of equipment cleaned for nitrox use.
 - Physical and physiological considerations of nitrox diving (eg.: O₂ and CO₂ toxicity)
 - Diving regulations, procedures/operations, and dive planning as related to nitrox diving
 - Equipment marking and maintenance requirements
 - Dive table and/or dive computer usage
 - Calculation of: MOD, pO₂, and other aspects of Nitrox diving as required by the DCB

6.20 Minimum Activity to Maintain Authorization

The diver should log at least one nitrox dive per year. Failure to meet the minimum activity level may be cause for restriction or revocation of nitrox authorization.

6.30 Operational Requirements

- **Oxygen Exposure Limits**
 - The inspired oxygen partial pressure experienced at depth should not exceed 1.6 ATA.
 - The maximum allowable exposure limit should be reduced in cases where cold or strenuous dive conditions, or extended exposure times are expected.
- **Calculation of Decompression Status**
 - A set of DCB approved nitrox dive tables should be available at the dive site.
 - Dive computers may be used to compute decompression status during nitrox dives. Manufacturers' guidelines and operation instructions should be followed.
 - Dive computers capable of pO₂ limit and fO₂ adjustment should be checked by the diver prior to the start each dive to ensure conformity with the mix being used.
- **Gas Mixture Requirements**
 - Only nitrox mixtures and mixing methods approved by the DCB may be used.
 - OM personnel mixing nitrox must be qualified and approved by the DCB for the method(s) used.
 - Oxygen used for mixing nitrox should meet the purity levels for "Medical Grade" (U.S.P.) or "Aviator Grade" standards.
 - 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), must also have a hydrocarbon contaminant no greater than .01 mg/m³.
 - For remote site operations using compressors not controlled by the OM where this is not verifiable, the DCB must develop a protocol to mitigate risk to the diver.
- **Analysis Verification by User**
 - 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.
 - Individual dive log reporting forms should report fO₂ of nitrox used, if different than 21%.

6.40 Nitrox Diving Equipment

- **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:

- Labeled SCUBA Cylinders in Accordance with Industry Standards
- Oxygen Analyzers
- Oxygen compatible equipment as applicable
- **Requirement for Oxygen Service**
 - All equipment, which during the dive or cylinder filling process is exposed to concentrations greater than 40% oxygen, should be cleaned and maintained for oxygen service.
 - Any equipment used with oxygen or mixtures containing over 40% by volume oxygen must be designed and maintained for oxygen service. Oxygen systems over 125 psig must have slow-opening shut-off valves.
- **Compressor system**
 - Compressor/filtration system must produce oil-free air, or
 - An oil-lubricated compressor placed in service for a nitrox system should be checked for oil and hydrocarbon contamination at least quarterly.

SECTION 7.00 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.

7.10 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.

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

Procedures

- Each diver must be continuously tended while in the water.
- A diver must be stationed at the underwater point of entry when diving is conducted in enclosed or physically confined spaces.
- Each diving operation must have a primary breathing gas supply sufficient to support divers for the duration of the planned dive including decompression.
- 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;
- A diver using Surface Supply may rely on surface personnel to keep the diver's depth, time and diving profile
- Surface supplied air diving must not be conducted at depths deeper than 190 feet (57.9 m).
- The OM DCB is responsible for developing additional operational protocols

Manning Requirements

The minimum number of personnel comprising a surface supplied dive team is three. They consist of: a Designated Person-In-Charge (DPIC), a Diver, and a Tender. Additional dive team members are required when a diving operation or dive site is considered complex, or when the task loading of a dive team member is deemed excessive. It is the OM DCB's responsibility to define when the surface supplied dive team must be expanded beyond the minimum manning requirements.

Equipment

- 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.
- 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.

- Masks and Helmets
 - Surface supplied and mixed gas masks and helmets must have:
 - A non-return valve at the attachment point between the mask/helmet and hose which must close readily and positively; and
 - An exhaust valve
 - 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
 - Helmets or masks connected directly to the dry suit or other buoyancy-changing equipment must be equipped with an exhaust valve
- Air supplied to the diver must meet the air quality standards outlined in section 3.60

Surface Supplied in Aquariums

- In an aquarium habitat where the maximum depth is known, a pneumofathometer is not required.
- The maximum obtainable depth of the aquarium may be used as the diving depth
- 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 the OM DCB.
- The OM DCB is responsible for developing additional operational protocols for surface supplied diving specific to the aquarium environment.

7.40 Hookah

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.

Equipment Requirements

- The air supply hose must be rated for a minimum operating pressure of 130psi.
- Air supplied to the hookah diver must meet the air quality standards outlined in section 3.60
- 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.
- 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.
- An independent reserve breathing gas supplied will be carried by each hookah diver:
 - When the diver does not have direct access to the surface or
 - At depths or distance from alternate breathing gas source determined by the DCB.

Operational Requirements

- Hookah diving must not be conducted beyond depths or distance from alternate breathing

gas source as determined by the DCB.

- 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
- Hookah divers not supported by diving bell, or underwater habitat must not be exposed to dives that require staged decompression.
- The OM DCB is responsible for developing additional operational protocols.

Hookah Diving in Aquariums

- In an aquarium habitat where the maximum depth is known and planned for, a depth gauge is not required.
- The maximum obtainable depth of the aquarium may be used as the maximum diving depth.
- 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 OM DCB.
- The OM DCB is responsible for developing additional operational protocols for hookah diving specific to the aquarium environment.

SECTION 8.00 STAGED DECOMPRESSION DIVING

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

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

8.10 Minimum Experience and Training Requirements

- a) 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](#) recommended.
- b) Training shall be appropriate for the conditions in which dive operations are to be conducted.
- c) Minimum Training shall 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, to estimate gas consumption rates, and to practice emergency procedures.
 3. At least 6 open-water training dives simulating/requiring decompression shall be conducted, emphasizing planning and execution of required decompression dives, and including practice of emergency procedures.
 4. Progression to greater depths shall be by 4-dive increments at depth intervals as specified in [Section 4](#).
 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
7. Divers shall demonstrate to the satisfaction of the USF Diving Safety Office, DSO or the DSO's designee, proficiency in planning and executing required decompression dives appropriate to the conditions in which diving operations are to be conducted.
8. Upon completion of training, the diver shall be authorized to conduct required decompression dives with DSO approval.

8.20 Minimum Equipment Requirements:

- a) Valve and regulator systems for primary (bottom) gas supplies shall be configured in a redundant manner that allows continuous breathing gas delivery in the event of failure of any one component of the regulator/valve system.
- b) Cylinders with volume and configuration adequate for planned diving operations.
- c) One of the second stages on the primary gas supply shall be configured with a hose of adequate length to facilitate effective emergency gas sharing in the intended environment.
- d) Minimum dive equipment shall include:
 1. Snorkel is an optional piece of equipment, as determined by the conditions and environment.
 2. Diver location devices adequate for the planned diving operations and environment.
 3. Compass
- e) Redundancy in the following components is desirable or required at the discretion of the USF Diving Safety Office, DSO or DCB:
 1. Decompression Schedules
 2. Dive Timing Devices
 3. Depth gauges
 4. Buoyancy Control Devices
 5. Line cutting devices
 6. Lift bags and line reels

8.30 Minimum Operational Requirements

- a) Approval of dive plan applications to conduct required decompression dives shall be on a case-by-case basis.
- b) The maximum pO_2 to be used for planning required decompression dives is 1.6. It is recommended that a pO_2 of less than 1.6 be used during bottom exposure.
- c) Divers gas supplies shall be adequate to meet planned operational requirements and foreseeable emergency situations.
- d) Decompression dives may be planned using dive tables, dive computers, and/or PC software approved by the USF Diving Safety Office, DSO or the DCB.
- e) Breathing gases used while performing in-water decompression shall contain the same or greater oxygen content as that used during the bottom phase of the dive.
- f) The dive team prior to each dive shall review emergency procedures appropriate for the planned dive.
- g) If breathing gas mixtures other than air are used for required decompression, their use shall be in accordance with those regulations set forth in the appropriate sections of this Manual.
- h) The maximum depth for required decompression using air as the bottom gas shall be 190 feet. The DSO may require using a mixed gas for depths of 150 feet and deeper.
- i) Use of additional nitrox and/or high-oxygen fraction decompression mixtures as travel and decompression gases to decrease decompression obligations is encouraged.
- j) Use of alternate inert gas mixtures to limit narcosis may be required by the Diving Safety Office for depths of 150 feet or greater.
- k) If a period of more than 6 months has elapsed since the last mixed gas dive, a series of progressive workup dives to return the diver(s) to proficiency status prior to the start of project diving operations are recommended.
- l) Mission specific workup dives are recommended.

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.

9.10 Minimum Experience and Training Requirements

- a) Prerequisites:
 1. Nitrox certification and authorization ([Section 6.00](#))
 2. If the intended use entails required decompression stops, divers will be previously certified and authorized in decompression diving ([Section 8.00](#)).
 3. Divers shall demonstrate to the DSO's satisfaction skills, knowledge, and attitude appropriate for training in the safe use of mixed gases.
- b) 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

- c) 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 shall 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 shall not exceed 260 feet.
 - 6. Diving operations beyond 260 feet requires additional training dives.

9.20 Equipment and Gas Quality Requirements

- a) Equipment requirements shall be developed and approved by the Diving Safety Office, DSO or DCB, and met by divers, prior to engaging in mixed-gas diving. Equipment shall meet other pertinent requirements set forth elsewhere in this standard.
- b) The quality of inert gases used to produce breathing mixtures shall be of an acceptable grade for human consumption.

9.30 Minimum Operational Requirements

- a) Approval of dive plan applications to conduct mixed gas dives shall be on a case-by-case basis.
- b) All applicable operational requirements for nitrox and decompression diving shall be met.
- c) The maximum pO_2 to be used for planning required decompression dives is 1.6. It is recommended that a pO_2 of less than 1.6 be used during bottom exposure.
- d) Maximum planned Oxygen Toxicity Units (OTU) will be considered based on mission duration.
- e) Divers decompressing on high-oxygen concentration mixtures shall closely monitor one another for signs of acute oxygen toxicity.

If a period of more than 6 months has elapsed since the last mixed gas dive, a series of progressive workup dives to return the diver(s) to proficiency status prior to the start of project diving operations are recommended.

SECTION 10.00 LIVE BOATING

Liveboat diving or liveboating (also commonly called Drift Diving) refers to diving from a vessel that is not moored to the bottom while the divers are in the water.

10.10 Purpose

This procedure is used for a variety of reasons such as:

- Diving in areas of high current where returning to a moored vessel would be either difficult or unsafe.
- When conducting a search of a large area or an area that is bottom feature dependent.
- When deploying a “shot line” for descents/ascents at a specific location where mooring would be undesirable.
- When utilizing an untethered underwater vehicle.

10.20 Environmental Conditions which would prohibit Liveboating

Liveboating will **NOT** be conducted during periods of bad weather such as:

- Low visibility due to fog or rain.
- Sea states higher than Beaufort number 3 (7-10 knots of wind).
- High winds that affect maneuverability.

10.30 Procedures for Liveboating

The following procedures **MUST** be followed on all Liveboat dives.

- The Captain of the vessel **MUST** give permission before any diver enters or exits the water.
- A spotter, positioned on the vessel, will be posted to watch for divers on or near the surface throughout the entire time the divers are in the water. The Captain **MUST** check with the spotter to determine the diver’s position before engaging the propellers. In most circumstances the spotter would also double as the safety diver.
- The propellers of the boat **MUST** be stopped whenever divers are entering the water, leaving the water, or approaching the vessel.
- A Chase Boat **MUST** be readied for deployment should the need occur. The deployment of this chase vessel would be at the discretion of the Captain. The Lead diver or safety diver has the ability to request the deployment of the chase boat anytime prior to or during the dive. This request could occur in the pre-dive planning as outlined above.
- The Chase Boat **MUST** be deployed whenever the divers are carrying “heavy” items. These items may include instrumentation, artifacts, stage bottles or tools. In this case the chase vessel must be deployed in order to retrieve any equipment the divers want to offload.

a) Diver and Vessel Crew Responsibilities:

1. The divers **MUST** either:

- a. Deploy in groups no greater than 6 with the group leader maintaining control of a line attached to a floatation device that would remain on the surface marking the location of the group.
 - i. This floatation device must have enough line attached to allow the group leader movement along the bottom without being tugged to the surface due to current or wave action. This floatation device must also include a dive flag if the vessel is to stray any distance from the area.
 - ii. In the event of extremely low visibility the Lead Diver may choose the option of having divers tether themselves to the float line.
 - iii. Each buddy team should consider the group leader as also being their buddy. Should any buddy team lose contact with the group leader then they should consider themselves lost. They should then follow the standard procedure of looking for the group leader for no more than 1 minute and if the group leader is not found then they should surface.
 - b. Descend/ascend on a previously deployed “shot line” which would have ample weight on the bottom to keep it from drifting as well as ample floatation on the surface to keep it from sinking. This floatation device, usually a float ball, must be constructed of a highly durable material providing high visibility to the vessels crew.
2. Each diver **MUST** have their own “surface marking device”, more commonly called a rescue sausage, in the event the diver gets separated from his group. Decompression dives will not be allowed without permission of the USF Diving Safety Office.
 3. All participating divers **MUST** be cleared to dive utilizing this mode of diving by the USF Diving Safety Office. All the divers need to be briefed on the procedures.
 4. The Captain of the vessel **MUST** obtain prior clearance from the Marine Superintendent before any diving can take place utilizing Liveboating.
 5. Liveboating will **NOT** be permitted at night

10.40 Guidelines for Liveboating

The following guidelines are to be followed in order for Liveboating to be conducted:

- a) The Lead Diver must thoroughly discuss with the Captain of the Vessel the procedures for each dive. Each must agree upon the proper course of action to be taken. It is then the responsibility of the Lead Diver to fully inform his/her divers of this plan as well as the Captain’s duty to inform his crew. The following are topics that must be included in this discussion:
 1. Pre dive planning - During this phase the following items must be addressed:
 - (a) Participating **personnel** – each individual must be identified, both the divers as well as the topside vessel staff. Each participant must have his or her duties spelled out in detail.
 - (b) The type of **communication** that will be utilized between the Captain of the Vessel, any intermediary personnel and the divers
 - (c) The deployment of any **safety equipment** – this would include float lines, chase vessels and throwing rings.
 - (d) The deployment of the **divers**.
 - (i) **A specific protocol MUST be established which will tell the divers when they are to be permitted to enter the water.**

- (e) The deployment of the **chase vessel**.
 - (i) The use and deployment of the chase vessel must be discussed by the Captain of the vessel and Lead diver. This discussion shall include:
 1. Who will operate the chase vessel.
 2. Communication between the main vessel and the chase vessel
 3. Deployment and retrieval of divers from the chase vessel
 4. procedure for transferring personnel between main vessel and chase vessel
- (f) The **movement of the main vessel – engaging the propellers**. Including but not limited to:
 - (i) To maintain position within a reasonable distance of the divers
 - (ii) To maintain a favorable position within the seas
 - (iii) To gain a better vantage point for tracking the divers
- (g) The **recall protocol** – a specific recall procedure will be specified should an event arise where it would be either beneficial or critical, to either the divers or the vessel, to get the divers out of the water.
- (h) The **retrieval of the divers** – depending on the circumstances of the dive protocol must be established which would tell the divers in the water when they would be allowed to approach the vessel. This would only occur after the Captain has disengaged the vessels propellers. Specific circumstances might include:
 - (i) Free drifts
 - (ii) Shotline - descent/ascent
 - (iii) Use of underwater vehicles
- (i) **Emergency Standard Operating Procedures** should be discussed should an emergency arise. This should include both diving and non-diving scenarios. The divers should be informed what role they are expected to perform. These roles might include but are not limited to;
 - (i) Administer CPR
 - (ii) Administer First Aid
 - (iii) Administer Oxygen

If there is a failure to agree on any of these guidelines or procedures between the Lead Diver and the Captain of the Vessel then the Liveboating must be aborted.

SECTION 12.0 REBREATHERS

This section defines specific considerations regarding the following issues for the use of rebreathers within the USF Scientific Diving Program:

- Training and/or experience verification requirements for authorization
- Equipment requirements
- Operational requirements and additional safety protocols to be used

Application of this standard is in addition to pertinent requirements of all other sections of the AAUS Standards for Scientific Diving, Volumes 1 and 2.

For rebreather dives that also involve staged decompression and/or mixed gas diving, all requirements for each of the relevant diving modes shall be met. Diving Control Board reserves the authority to review each application of all specialized diving modes, and include any further requirements deemed necessary beyond those listed here on a case-by-case basis.

No diver shall conduct planned operations using rebreathers without prior review and approval of the DCB.

In all cases, trainers shall be qualified for the type of instruction to be provided. Training shall be conducted by agencies or instructors approved by DSO and DCB.

12.10 Definitions and General Information

- a) Rebreathers are defined as any device that recycles some or all of the exhaled gas in the breathing loop and returns it to the diver. Rebreathers maintain levels of oxygen and carbon dioxide that support life by metered injection of oxygen and chemical removal of carbon dioxide. These characteristics fundamentally distinguish rebreathers from open-circuit life support systems, in that the breathing gas composition is dynamic rather than fixed.
1. Advantages of rebreathers may include increased gas utilization efficiencies that are often independent of depth, extended no-decompression bottom times and greater decompression efficiency, and reduction or elimination of exhaust bubbles that may disturb aquatic life or sensitive environments.
 2. Disadvantages of rebreathers include high cost and, in some cases, a high degree of system complexity and reliance on instrumentation for gas composition control and monitoring, which may fail. The diver is more likely to experience hazardous levels of hypoxia, hyperoxia, or hypercapnia, due to user error or equipment malfunction, conditions which may lead to underwater blackout and drowning. Inadvertent flooding of the breathing loop and wetting of the carbon dioxide absorbent may expose the diver to ingestion of an alkaline slurry ("caustic cocktail").
 3. An increased level of discipline and attention to rebreather system status by the diver is required for safe operation, with a greater need for self-reliance. Rebreather system design and operation varies significantly between make and model. For these reasons when evaluating any dive plan incorporating rebreathers, risk-management emphasis should be placed on the individual qualifications of the diver on the specific rebreather make and model to be used, in addition to specific equipment requirements and associated operational protocols.

Classes of Rebreathers

1. **Oxygen Rebreathers.** Oxygen rebreathers recycle breathing gas, consisting of pure oxygen, replenishing the oxygen metabolized by the diver. Oxygen rebreathers are generally the least complicated design, but are normally limited to a maximum operation depth of 20fsw due to the risk of unsafe hyperoxic exposure.
2. **Semi-Closed Circuit Rebreathers.** Semi-closed circuit rebreathers (SCR) recycle the majority of exhaled breathing gas, venting a portion into the water and replenishing it with a constant or variable amount of a single oxygen-enriched gas mixture. Gas addition and venting is balanced against diver metabolism to maintain safe oxygen levels by means which differ between SCR models, but the mechanism usually provides a semi-constant fraction of oxygen (FO_2) in the breathing loop at all depths, similar to open-circuit SCUBA.
3. **Closed-Circuit Mixed Gas Rebreathers.** Closed-circuit mixed gas rebreathers (CCR) recycle all of the exhaled gas and replace metabolized oxygen via an electronically controlled valve, governed by electronic oxygen sensors. Manual oxygen addition is available as a diver override, in case of electronic system failure. A separate inert gas source (diluent), usually containing primarily air, heliox, or trimix, is used to maintain oxygen levels at safe levels when diving below 20fsw. CCR systems operate to maintain a constant oxygen partial pressure (PPO_2) during the dive, regardless of depth.

12.20 Prerequisites

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

Training Prerequisites

- a) Active scientific diver status, with depth qualification sufficient for the type, make, and model of rebreather, and planned application.
- b) Completion of a minimum of 50 open-water dives on SCUBA.
- c) For SCR or CCR, a minimum 100-fsw-depth qualification is generally recommended, to ensure the diver is sufficiently conversant with the complications of deeper diving. If the sole expected application for use of rebreathers is shallower than this, a lesser depth qualification may be allowed with the approval of the DCB.
- d) Nitrox training. Training in use of nitrox mixtures containing 25% to 40% oxygen is required. Training in use of mixtures containing 40% to 100% oxygen may be required, as needed for the planned application and rebreather system. Training may be provided as part of rebreather training.

12.30 Training

- a) Specific training requirements for use of each rebreather model must be defined by the USF DCB on a case-by-case basis. Training must include factory-recommended requirements, but may exceed this to prepare for the type of mission intended (e.g., staged decompression or heliox/trimix CCR diving)
- b) Successful completion of training does not in itself authorize the diver to use

rebreathers. The diver must demonstrate to the DCB or its designee that the diver possesses the proper attitude, judgment, and discipline to safely conduct rebreather diving in the context of planned operations.

- c) Post training supervised dives are required before the Scientific rebreather diver is authorized to use rebreather for research dives. (see training section for details).

Individual Equipment Requirements

Individual Equipment Requirements			
Key: X = include, IA = If Applicable			
	O2	SCR	CCR
DCB approved rebreather make and model	X	X	X
Bottom timer, and depth gauge	X	X	X
Dive computer (separate from rebreather unit)		X	X
Approved dive tables		IA	IA
SMB (surface marker buoy) and line reel or spool with sufficient line to deploy an SMB from the bottom in the training environment	IA	IA	IA
Access to an oxygen analyzer	X	X	X
Cutting implement	X	X	X
BCD capable of floating a diver with a flooded loop and/or dry suit at the Surface	X	X	X
Bailout gas supply of sufficient volume for planned diving activities	X	X	X
Approved CO2 absorbent and other consumables	X	X	X

12.40 Equipment Requirements

A. General

1. Only those models of rebreathers specifically approved by DCB shall be used.
2. Rebreathers should meet the quality control/quality assurance protocols of the International Organization for Standardization (ISO) requirements: ISO 9004: 2009 or the most current version, AND successful completion of CE (Conformité Européenne) or DCB approved third party testing.
3. Rebreather modifications (including consumables and operational limits) that deviate from or are not covered by manufacturer documentation should be discussed with the manufacturer and approved by the DCB prior to implementation.

B. Equipment Maintenance Requirements

1. The DCB or their designee will establish policies for the maintenance of rebreathers and related equipment under their auspices. Rebreathers should be maintained in accordance with manufacturer servicing recommendations.

2. Field repairs and replacement of components covered in rebreather diver training is not annual maintenance and may be performed by the rebreather diver in accordance with DCB policy.
3. A maintenance log will be kept and will minimally include:
 - a) Dates of service
 - b) Service performed
 - c) Individuals or company performing the service

12.50 Operational Requirements

A. Dive Plan

1. In addition to standard dive plan components, at a minimum all dive plans that include the use of rebreathers must include:
 - a) Information about the specific rebreather model(s) to be used
 - b) Type of CO₂ absorbent material
 - c) Composition and volume(s) of supply gasses
 - d) Bailout procedures
 - e) Other specific details as required by the DCB
- B. Particular attention should be paid to using rebreathers under conditions where vibration or pulsating water movement could affect electronics or control switches and systems.
- C. Particular attention should be paid to using rebreathers under conditions where heavy physical exertion is anticipated.
- D. Respired gas densities should be less than $5 \text{ g}\cdot\text{L}^{-1}$, and should not exceed $6 \text{ g}\cdot\text{L}^{-1}$ under normal circumstances.
- E. User replaceable consumable rebreather components should be replaced per manufacture recommendations or as defined by the DCB
- F. If performed, periodic field validation of oxygen cells should be conducted per DCB designated procedure
- G. Diver carried off-board bailout is not required under conditions where the onboard reserves are adequate to return the diver to the surface while meeting proper ascent rate and stop requirements, and the system is configured to allow access to onboard gas. These

calculations must take into consideration mixed mode operations where an open circuit diver could require assistance in an out of gas situation

- H. Use and reuse of CO₂ scrubber media should be per manufacture recommendations or as defined by the DCB
- I. Planned oxygen partial pressure in the breathing gas shall not exceed 1.4 atmospheres at depths greater than 30 feet, or 1.6 at depths less than 30feet
- J. Both CNS and Oxygen Tolerance Units (OTUs) should be tracked for each diver. Exposure limits should be established by the DCB
- K. The DCB or their designee will:
 - 1. Establish policies for the use of checklists related to rebreather operations
 - 2. Establish policies for pre and post dive equipment checks to be conducted by their divers
 - 3. Establish policies for disinfection of rebreathers to be used by their divers
 - 4. Establish policies for pre-breathing of rebreathers used by their divers
 - 5. Establish policies for the use of mixed mode and mixed rebreather platform dive teams under their auspices.
 - a) Mixed mode and/or mixed platform dive teams are permitted.
 - b) At minimum, divers must be cross briefed on basic system operations for establishing positive buoyancy, closing a rebreather diver's breathing loop, and procedures for gas sharing
 - 6. Establish policies for the maximum depth of dives conducted using a particular class of rebreather within the auspices of their diving operations
 - 7. Establish policies for depth progression/depth certification/depth certification maintenance for divers using rebreathers
 - 8. Establish policies for implementing workup dives within program
 - a) Pre-operation workup dives, including review and practice of emergency recognition and response skills, and management of task loading are required for operations defined by the DCB as beyond the scope of normal operating conditions.
 - 9. Establish policies for the minimum use of rebreathers to maintain proficiency.
 - a) The minimum Annual rebreather diving activity should be 12 rebreather dives, with a minimum of 12 h underwater time.

- b) To count, dives should be no less than 30 min in duration. A required element of maintaining proficiency is the periodic performance and reevaluation of skills related to in-water problem recognition and emergency procedures
- L. Establish policies for reauthorization for the use of rebreathers if minimum proficiency requirements are not met
- 1. Reestablishment of authorization to use rebreathers must require more than just performing a dive on a particular make or model of rebreather
 - 2. At minimum demonstrated skills included in the required training elements for the level of rebreather operation must be performed and reevaluated.

REBREATHER TRAINING SECTION

A. Entry Level Training

- 1. The training area for O₂ Rebreather should not exceed 20 fsw in depth
- 2. Entry level CCR and SCR training is limited in depth of 130fsw and shallower
- 3. Entry level CCR and SCR training is limited to nitrogen/oxygen breathing media
- 4. Divers at the CCR and SCR entry level may not log dives that require a single decompression stop longer than 10 minutes
- 5. Who may teach: Individuals authorized as a CCR, SCR, or O₂ Rebreather Instructor by the DCB; in all cases, the individual authorized must have operational experience on the rebreather platform being taught, and where applicable the individual being authorized should be authorized as an instructor by the respective rebreather manufacturer or their designee.
- 6. Maximum Student/Instructor Ratio: 4 to 1. This ratio is to be reduced as required by environmental conditions or operational constraints.
- 7. Upon completion of practical training, the diver must demonstrate proficiency in pre-dive, dive, and post-dive operational procedures for the particular model of rebreather to be used.
- 8. Supervised dives target activities associated with the planned science diving application. Supervisor for these dives is the DSO or designee, experienced with the make/model rebreather being used.

Rebreather Entry Level Training Requirements

Key: X = include, IA = If Applicable, ISE = If So Equipped

	O2	SCR	CCR
Required Training Topic			
Academic			
History of technology	X	X	X
Medical & physiological aspects of:			
Oxygen toxicity	X	X	X
chemical burns & caustic cocktail	X	X	X
Hypoxia – insufficient O ₂	X	X	X
Hypercapnia – excessive CO ₂	X	X	X
Arterial gas embolism	X	X	X
Middle Ear Oxygen Absorption Syndrome (oxygen ear)	X	X	X
Hygienic concerns	X	X	X
Nitrogen absorption & decompression sickness		X	X
CO ₂ retention	X	X	X
Hyperoxia-induced myopia	X	X	X
System design, assembly, and operation, including:			
Layout and design	X	X	X
Oxygen control systems	X	X	X
Diluent control systems		ISE	ISE
Use of checklists	X	X	X
Complete assembly and disassembly of the unit	X	X	X
Canister design & proper packing and handling of chemical absorbent	X	X	X
Decompression management and applicable tracking methods		ISE	X
Oxygen and high pressure gas handling and safety	X	X	X
Fire triangle	X	X	X
Filling of cylinders	X	X	X
Pre-dive testing & trouble shooting	X	X	X
Post-dive break-down and maintenance	X	X	X
Trouble shooting and manufacturer authorized field repairs	X	X	X
Required maintenance and intervals	X	X	X
Manufacturer supported additional items (ADV, temp stick, CO ₂ monitor,	ISE	ISE	ISE
Dive planning:			
Operational planning	X	X	X
Gas requirements	X	X	X
Oxygen exposure and management	X	X	X
Gas density calculations		X	X
Oxygen metabolizing calculations	X	X	X
Scrubber limitations	X	X	X
Mixed mode diving (buddies using different dive modes)	X	X	X
Mixed platform diving (buddies using different rebreather platforms)	X	X	X
Problem Recognition & Emergency Procedures:			
Applicable open circuit emergency procedures for common gear	X	X	X
Loss of electronics	ISE	ISE	X
Partially flooded loop	X	X	X
Fully flooded loop	X	X	X

Cell warnings		ISE	X
Battery warnings	ISE	ISE	X
High O ₂ warning	ISE	ISE	X
Low O ₂ warning	ISE	ISE	X
High CO ₂ warning	ISE	ISE	ISE
Recognizing issues as indicated by onboard scrubber monitors	ISE	ISE	ISE
Recognizing hypercapnia signs and symptoms in self or others	X	X	X
Excluded O ₂ cell(s)	ISE	ISE	ISE
Loss of Heads Up Display (HUD)	ISE	ISE	ISE
Loss of buoyancy	X	X	X
Diluent manual add button not functioning		ISE	ISE
O ₂ manual add button not functioning	ISE	ISE	ISE
Exhausted oxygen supply	X	X	X
Exhausted diluent supply		ISE	ISE
Lost or exhausted bailout	ISE	ISE	ISE
Handset not functioning	ISE	ISE	ISE
Solenoid stuck open	ISE	ISE	ISE
Solenoid stuck closed	ISE	ISE	ISE
ADV stuck open	ISE	ISE	ISE
ADV stuck closed	ISE	ISE	ISE
Isolator valve(s) not functioning	ISE	ISE	ISE
Oxygen sensor validation	ISE	ISE	X
CO ₂ sensor validation	IA	IA	IA
Gas sharing	X	X	X
Diver assist and diver rescue	X	X	X
Other problem recognition and emergency procedures specific to the particular unit, environment, or diving conditions	X	X	X
Practical Training and Evaluations			
Demonstrated skills shall include, at a minimum:			
Use of checklists	X	X	X
Carbon dioxide absorbent canister packing	X	X	X
Supply gas cylinder analysis and pressure check	X	X	X
Test of one-way valves	X	X	X
System assembly and breathing loop leak testing	X	X	X
Oxygen control system calibration	ISE	ISE	X
Proper pre-breathe procedure	X	X	X
In-water bubble check	X	X	X
Proper buoyancy control during descent, dive operations, and ascent	X	X	X
System monitoring & control during descent, dive operations, and ascent	X	X	X
Proper interpretation and operation of system instrumentation	X	X	X
Proper buddy contact and communication	X	X	X
Use of a line reel or spool to deploy an SMB from planned dive depth and while controlling buoyancy in the water column	X	X	X
Proper management of line reel or spool, and SMB during ascents and safety or required stops	X	X	X
Unit removal and replacement on the surface	X	X	X
Bailout and emergency procedures for self and buddy, including:			
System malfunction recognition and solution	X	X	X

Manual system control	ISE	ISE	ISE
Flooded breathing loop recovery	IA	IA	IA
Absorbent canister failure	X	X	X
Alternate bailout options	X	X	X
Manipulation of onboard and offboard cylinders	X	X	X
Manipulation of bailout cylinders (removal, replacement, passing and receiving while maintaining buoyancy control)	ISE	ISE	ISE
Manipulation of quick disconnects, isolator valves, and manual controls specific to the unit and gear configuration	ISE	ISE	ISE
Proper system maintenance, including:			
Breathing loop disassembly and disinfection	X	X	X
Oxygen sensor replacement	ISE	ISE	ISE
Battery removal and replacement or recharging	ISE	ISE	ISE
Other tasks as required by specific rebreather models	X	X	X
Written Evaluation	X	X	X
Supervised Rebreather Dives	X	X	X
Entry Level Training – Minimum Underwater Requirements			
	Pool/Confined Water	Openwater	Supervised Dives
O2	1 Dive, 90 – 120 minutes	4 dives, 120 minute	2 Dives, 120 minute
SCR	1 Dive, 90 – 120 minutes	4 dives, 120 minute	4 dives, 120 minute
CCR	1 Dive, 90 – 120 minutes	8 dives, 380 minute	4 dives, 240 minute

B. Rebreather Required Decompression, Mixed Gas, and Hypoxic Mix Training

1. Required Decompression and Mixed Gas Training may be taught separately or combined. If combined, open water and supervised dive requirements are added together to equal the total of the courses if taught separately.
2. Prerequisites:
 - a) Required Decompression 25 rebreather dives for a minimum cumulative dive time of 25 hours.
 - b) Mixed Gas:
 - (1) Non-hypoxic Mixes – 25 rebreather dives for a minimum cumulative dive time of 25 hours
 - (2) Hypoxic Mixes – Rebreather Required Decompression Certification and Mixed Gas Certification and 25 dives for a minimum cumulative dive time of 40 hours on dives requiring decompression.
3. Who may teach: Individuals authorized as a CCR/SRC required decompression and/or Mixed Gas and/or Hypoxic Mix instructor by the DCB or their designee (this is in addition to the original authorization from section A #5)

4. Maximum Student/Instructor Ratio: 2 to 1. This ratio is to be reduced as required by environmental conditions or operational constraints
5. Upon completion of practical training, the diver must demonstrate proficiency in pre-dive, dive, and post-dive operational procedures for the particular model of rebreather to be used
6. Supervised dives target activities associated with the planned science diving application. Supervisor for these dives is the DSO or designee, experienced with the make/model rebreather being used

Rebreather Required Decompression, Mixed Gas & Hypoxic Mix Training Requirements			
Key: X = include, IA = If Applicable, ISE = If So Equipped			
	Deco	Mixed Gas	Hypoxic Mixes
Required Training Topic			
Academic			
Review of applicable subject matter from previous training	X	X	X
Medical & physiological aspects of:			
Hypercapnia, hypoxia, hyperoxia	X	X	X
Oxygen limitations	X	X	X
Nitrogen limitations	X	X	X
Helium absorption and elimination		X	X
High Pressure Nervous Syndrome (HPNS)			X
System design, assembly, and operation, including:			
Gear considerations and rigging	X	X	X
Gas switching	X	X	X
Dive planning:			
Decompression calculation	X	X	X
Gradient Factors	X	X	X
Scrubber duration and the effects of depth on scrubber function	X	X	X
Gas requirements including bailout scenarios	X	X	X
Bailout gas management – individual vs team bailout	X	X	X
Gas density calculations	X	X	X
Operational Planning	X	X	X
Equivalent narcosis depth theory		X	X
Gas selection, gas mixing and gas formulas		X	X
Problem Recognition & Emergency Procedures:			
Applicable open circuit emergency procedures for common gear elements	X	X	X
Flooded loop	X	X	X
Cell warnings	X	X	X
Battery warnings	X	X	X
Hypercapnia, hypoxia, hyperoxia	X	X	X
Practical Training and Evaluations			

Demonstrated skills shall include, at a minimum:			
Proper demonstration of applicable skills from previous training	X	X	X
Proper manipulation of DSV and/or BOV	X	X	X

Proper descent and bubble check procedures	X	X	X
Proper monitoring of setpoint switching and pO2 levels	X	X	X
Proper interpretation and operation of system instrumentation	X	X	X
System monitoring & control during descent, dive operations, and ascent	X	X	X
Demonstrate the ability to manually change setpoint and electronics settings during the dive	ISE	ISE	ISE
Demonstrate buoyancy control; ability to hover at fixed position in water column without moving hands or feet	X	X	X
Onboard and offboard valve manipulation for proper use, and reduction of gas loss	X	X	X
Diagnosis of and proper reactions for a flooded absorbent canister	X	X	X
Diagnosis of and proper reactions for CO ₂ breakthrough	X	X	X
Diagnosis of and proper response to Cell Errors	X	X	X
Diagnosis of and proper reactions for Low oxygen drills	X	X	X
Diagnosis of and proper reactions for Flooded Loop	X	X	X
Diagnosis of and proper reactions for High Oxygen Drills	X	X	X
Diagnosis of and proper reactions for electronics and battery failure	X	X	X
Operation in semi-closed mode	X	X	X
Properly execute the ascent procedures for an incapacitated dive buddy	X	X	X
Demonstrate controlled ascent with an incapacitated diver including surface tow at least 30 metres / 100 feet with equipment removal on surface, in water too deep to stand	X	X	X
Proper buddy contact and communication	X	X	X
Use of a line reel or spool to deploy an SMB from planned dive depth and while controlling buoyancy in the water column	X	X	X
Proper management of line reel or spool, and SMB during ascents and safety or required stops	X	X	X
Demonstrate the ability to maintain minimum loop volume	X	X	X
Demonstrate comfort swimming on surface and at depth carrying a single bailout/decompression cylinder/bailout rebreather	X		
Demonstrate ability to pass and retrieve a single bailout/decompression cylinder or bailout rebreather while maintaining position in the water column	X		
Demonstrate ability to pass and retrieve multiple bailout/decompression cylinders or bailout rebreather while maintaining position in the water column	IA	X	X
Demonstration of the ability to perform simulated decompression stops at pre-determined depths for scheduled times	X	X	X
Demonstration of the ability to perform decompression stops at pre-determined depths for scheduled times	X	X	X
Demonstrate competence managing multiple bailout cylinders, including drop and recovery while maintaining position in the water column	IA	X	X
Demonstrate appropriate reaction to simulated free-flowing deco regulator	X	X	X
Gas share of deco gas for at least 1 minute	X	X	X
Demonstrate oxygen rebreather mode at appropriate stop depth		X	X
Complete bailout scenarios from depth to include	X	X	X

decompression obligation on open circuit			
Written Evaluation	X	X	X
Supervised Rebreather Dives	X	X	X
Minimum Underwater Requirements			
	Pool/Confined Water	Openwater	Supervised Dives**
Deco	1 Dive / 60 min	7 Dives / 420 min*	4 Dives / 240 min.*
Mixed Gas	1 Dive / 60 min	7 Dives / 420 min*	4 Dives / 240 min.*
Hypoxic Mixes		7 Dives / 420 min	4 Dives / 240 min.
<p>*If Deco and Mixed Gas training are done concurrently, a minimum of three mixed gas dives for a minimum cumulative time of 180 minutes must be conducted; a minimum of 4 supervised dives is required</p> <p>**A minimum of three supervised dives should comply with certification parameters</p>			

B. Rebreather Crossover Training

1. Crossover training to a new rebreather platform requires a minimum of 4 training dives for a minimum cumulative dive time of 240 min.
2. Advanced level certification on a new rebreather platform may be awarded upon successful demonstration of required skills using the new platform

SECTION 13 SCIENTIFIC CAVE AND CAVERN DIVING STANDARD

This standard helps to ensure all scientific diving in overhead environments is conducted in a manner which will maximize the protection of scientific divers from accidental injury and/or illness and provide the basis allowing the working reciprocity between AAUS organizational members.

If a conflict exists between this standard and other standards in this manual, the information set forth in this standard only takes precedence when the scientific diving being conducted takes place wholly or partly within an underwater cave or cavern environment.

A dive team shall be considered to be cave or cavern diving if at any time during the dive they find themselves in a position where they cannot complete a direct, unobstructed ascent to the surface because of rock formations.

The member organization requires that no person shall engage in scientific cave or cavern diving unless that person holds a recognized certificate/authorization issued pursuant to the provisions of this manual.

The diver must demonstrate to the DCB or it's designee that the diver possesses the proper attitude, judgment, and discipline to safety conduct cave and cavern diving in the context of planned operations.

Operational requirements for cave and cavern diving have been established through accident analysis of previous cave diving accidents.

13.1 Definitions

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

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.

Cave – A dive shall be considered a cave dive if any one or more of the environmental limits specified in the definition of cavern are exceeded or otherwise not followed. Linear penetrations limits shall not exceed the limits of each diver's training.

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 - An entrance and first chamber to a cave where:

1. Sunlight from the entrance is visible to all dive team members at all times during the dive.
2. Members of the dive team do not pass through any restrictions that don't allow the divers to swim side by side during the dive, nor are there any restrictions between the divers and the most expeditious exit to the surface.
3. Maximum depth achieved shall not exceed the depth ratings of dive team.

Cavern Dive - A dive which takes place partially or wholly underground, in which the following environmental parameters are met:

1. Natural sunlight is continuously visible from the entrance.
2. Environmental conditions will be evaluated by the DSO or designee and appropriate limits incorporated into the dive plan.

Dual Valve 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.

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).

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.

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

Knife/Line Cutter - Small, sharp blade capable of easily cutting a guideline and that is accessible to the diver.

Lava Tube - Type of cave or cavern formed by the surface hardening of a stream of flowing molten rock, which may later become flooded due to static sea level changes.

Line Marker - Any one of several types of markers attached to a guideline, which provides additional navigational information to the dive team, most commonly the direction out to the nearest surface.

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

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

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

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.

Scientific Cave or Cavern Diver In Training - Authorized to dive in the cave or cavern environment under the direct supervision of qualified instructional personnel for training purposes only.

Scientific Cavern Diver - Authorization to dive in an overhead environment as defined in cavern.

Scientific Cave Diver - Authorization to dive in an overhead environment as defined in cave.

Sidemount Diving - 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.

Solution Cave - Cave formed in carbonate or carbonate-cemented bedrock, formed by the dissolution of the rock by groundwater.

Spring - Cave with water flowing with a generally continuous outflow.

Sump - An area in a dry cave that can no longer be negotiated without the use of diving equipment.

Well - A vertical or nearly vertical shaft, usually manmade, through which a diver can access a dive site.

13.2 Cave and Cavern Environment Hazards

Current/Flow - Underwater caves have currents that vary in strength and direction. Of particular note is a condition known as siphoning. Siphoning caves have flow or current directed into the cave. This can cause poor visibility as a result of mud and silt being drawn into the cave entrance.

Silt - The presences of silt, sand, mud, clay, etc. on the cave floor can cause visibility to be reduced to nothing in a very short time.

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

Cave-ins - Cave-ins are a normal part of cave evolution; however experiencing a cave-in during diving operations is extremely unlikely.

13.3 Minimum Experience and Training Requirements

a) Cavern Diver

1. Prerequisites

The applicant for training shall have met the requirements in Section 5.00 of the *AAUS Standards for Scientific Diving Certification and Operation of Scientific Diving Programs*, fourth edition (2003), and hold as a minimum a scientific diver permit.

2. Cavern Training

The applicant is to participate in the following areas of training, or their equivalent:

- Classroom Lecture and Critique—The applicant shall participate in classroom discussion or equivalent type activities covering these topics: Policy for cavern diving, cavern environment and environmental hazards, accident analysis, psychological considerations, equipment, body control, communications, cavern diving techniques, navigation and guidelines, dive planning, cave geology, cave hydrology, cave biology, and emergency procedures.
- Land Drills—The applicant shall participate in drills above water using the guideline and reel. Drills are to emphasize proper use of the reel, techniques and considerations for laying a guideline, guideline following, buddy communication, and emergency procedures.

- Cavern Dives—A minimum of four (4) cavern dives, preferably to be conducted in a minimum of two (2) different caverns. Skills the applicant should demonstrate include: Safety drill (S-drill), gear matching, bubble check prior to entering the cavern on each dive, proper buoyancy compensator use, proper trim and body positioning, hovering and buoyancy with hand tasks, specialized propulsion techniques (modified flutter kick, modified frog kick, pull and glide, ceiling walk or shuffle), proper guideline and reel use, ability to follow the guideline with no visibility, sharing air while following a guideline, and sharing air while following the guideline with no visibility light and hand signal use, and ability to comfortably work in a cavern without assistance.
- Written Examination - A written evaluation approved by the DCB with a predetermined passing score, covering concepts of both classroom and practical training is required.

b) Cave Diver

1. Prerequisites

The applicant for training shall hold as a minimum a cavern diver permit.

2. Cave Training

The applicant is to participate in the following areas of training, or their equivalent:

- Classroom Lecture and Critique—The applicant shall participate in classroom discussion or equivalent type activities covering these topics: Review of the topics listed in cavern diver training and differing techniques and procedures used in cave diving, additional equipment procedures used in cave diving, cave diving equipment configurations, procedures for conducting diving operations involving complex navigation and use of line markers, advanced gas management and a thorough review of dive tables, decompression tables, and decompression theory.
- Land Drills—The applicant shall participate in drills above water included in cavern training. Drills are to emphasize proper use of the reel in lost diver procedures, as well as line placements and station location as required for surveying.
- Cave Dives—A minimum of twelve (12) cave dives, to be conducted in a minimum of four (4) different cave sites with differing conditions recommended. Skills the applicant should demonstrate include: Review of skills listed in cavern training, and special techniques in buoyancy control, referencing and back-up navigation, air sharing in a minor restriction using a single file method, special propulsion techniques in heavy outflow, anti-silting techniques, line jumping techniques and protocols, surveying, and ability to critique their dives. Emergency procedures training shall include proficiency in lost line, lost diver, gas sharing, light failure, valve manipulation, and no/low visibility situations.
- Written Examination - A written evaluation approved by the DCB with a predetermined passing score, covering concepts of both classroom and practical training is required.

13.4 Equipment Requirements

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

a) Cavern Diving Equipment

The following equipment shall be required, in excess of that detailed for open water SCUBA diving in Volume 1, Section 3.00. Each member of the dive team shall have:

- At minimum, a single tank equipped with an “H” valve or an alternate air supply.
- A BCD capable of being inflated from the tank.
- Slate and pencil.
- Two battery powered secondary lights of an approved type.
- Knife or line cutter.
- One primary reel of at least 350 feet for each team.
- Snorkel—No snorkel shall be worn while inside underwater cave or cavern.

b) Cave Diving Equipment

The following equipment shall be required, in excess of that detailed for cavern diving: Each member of the dive team shall have:

- Cylinders with dual orifice isolation valve manifold or independent SCUBA systems each capable of maintaining enough gas for the diver during exit and ascent to the surface.
- Two completely independent regulators, at least one of each having submersible tank pressure gauge, a five foot or longer second stage hose, low pressure inflator for the BCD.
- A primary light with sufficient burn time for the planned dive.
- Safety reel with at least 150 feet of line.
- Appropriate submersible dive tables and/or dive computer (computers w/ backup tables).
- Line markers.
- Snorkel—No snorkel shall be worn while inside underwater cave or cavern.

13.5 Operational Requirements and Safety Protocols

All members of the dive team must have met the applicable all sections of Volume One and applicable sections of Volume Two of the AAUS manual and be authorized for that type of diving by the DCB before conducting scientific cave dives.

a) Cavern Diver Procedures

- Cavern diving shall not be conducted at depths greater than 100 feet.
- Dive teams shall perform a safety drill prior to each cave or cavern penetration that includes equipment check, gas management, and dive objectives.
- Each team within the cavern zone must utilize a continuous guideline appropriate for the environment leading to a point from which an uninterrupted ascent to the surface may be made.
- Gas management must be appropriate for the planned dive with special considerations made for; DPV's, siphon diving, rebreathers, etc.
- The entire dive team is to immediately terminate the dive whenever any dive team member feels an unsafe condition is present.

b) Cave Diving Procedures

- Dive teams shall perform a safety drill prior to each cave or cavern penetration that includes equipment check, gas management, and dive objectives.
- Diver teams must run or follow a continuous guideline from the surface pool to maximum penetration.
- Gas management must be appropriate for the planned dive with special considerations made for: DPV's, siphon diving, rebreathers, etc.
- Each diver must carry one primary and two back up lights.
- Divers utilizing side mount diving or other dual independent diving systems must have the approval of the Diving Safety Officer or his/her designee.
- The entire dive team is to immediately terminate the dive whenever any dive team member feels an unsafe condition is present.

SECTION 14.00 OTHER DIVING TECHNOLOGY

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 USF Diving Safety Office and the AAUS. Divers shall comply with all scuba diving procedures in this standard unless specified.

14.10 Blue Water Diving

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

14.20 Ice And Polar Diving

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

14.30 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.

14.40 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.

14.50 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.

14.60 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.

Appendices

Appendix 1 through 11

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 University of South Florida or the Florida Institute of Oceanography. 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. Please contact the undersigned Diving Safety Officer if you have any questions or concerns about diving medicine or the University of South Florida or the Florida Institute of Oceanography standards. Thank you for your assistance.

Benjamin Meister
Diving Safety Officer

Date

4202 E. Fowler Ave. PED-214; Tampa, Florida 33620
Mailing Address

813-396-9223
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, judgment, emotional stability, or physical fitness. Please consult the following list of conditions that usually restrict candidates from diving.

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

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 disease¹. [33 - 35]
16. Atrial septal defects. [39]

¹ “Assessment of Cardiovascular Risk by Use of Multiple-Risk-Factor Assessment Equations.” Grundy et. al. 1999. AHA/ACC Scientific Statement. <http://www.acc.org/clinical/consensus/risk/risk1999.pdf>

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. Asthma². [42 - 44]
24. Chronic pulmonary disease, including radiographic evidence of pulmonary blebs, bullae, or cysts. [45,46]
25. Diabetes mellitus. [46 - 47]
26. Pregnancy. [56]

SELECTED REFERENCES IN DIVING MEDICINE

Most of these are available from Best Publishing Company, P.O. Box 30100, Flagstaff, AZ 86003-0100, the Divers Alert Network (DAN) or the Undersea and Hyperbaric Medical Association (UHMS), Bethesda, MD.

- ACC/AHA Guidelines for Exercise Testing. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Exercise Testing). Gibbons RJ, et al. 1997. Journal of the American College of Cardiology. 30:260-311. <http://www.acc.org/clinical/guidelines/exercise/exercise.pdf>
- Alert Diver Magazine; Articles on diving medicine <http://www.diversalertnetwork.org/medical/articles/index.asp>
- “Are Asthmatics Fit to Dive? “ Elliott DH, ed. 1996 Undersea and Hyperbaric Medical Society, Kensington, MD.
- “Assessment of Cardiovascular Risk by Use of Multiple-Risk-Factor Assessment Equations.” Grundy et. al. 1999. AHA/ACC Scientific Statement. <http://www.acc.org/clinical/consensus/risk/risk1999.pdf>
- DIVING MEDICINE, Third Edition, 1997. A. Bove and J. Davis. W.B. Saunders Company, Philadelphia
- DIVING AND SUBAQUATIC MEDICINE, Third Edition, 1994. C. Edmonds, C. Lowery and J. Pennefather. Butterworth-Heinemann Ltd. Oxford
- MEDICAL EXAMINATION OF SPORT SCUBA DIVERS, 1998. Alfred Bove, M.D., Ph.D. (ed.). Medical Seminars, Inc. San Antonio, TX
- NOAA DIVING MANUAL, NOAA. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.
- U.S. NAVY DIVING MANUAL. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

² “Are Asthmatics Fit to Dive? “ Elliott DH, ed. 1996 Undersea and Hyperbaric Medical Society, Kensington, MD.

APPENDIX 2
MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING REPORT

Name of Applicant (Print or Type)

Date of Medical Evaluation (Month/Day/Year)

To The Examining Physician: Scientific divers require periodic scuba diving medical examinations to assess their fitness to engage in diving with self-contained underwater breathing apparatus (scuba). Their answers on the Diving Medical History Form may indicate potential health or safety risks as noted. Scuba diving is an activity that puts unusual stress on the individual in several ways. Your evaluation is requested on this Medical Evaluation form. Your opinion on the applicant's medical fitness is requested. Scuba diving requires heavy exertion. The diver must be free of cardiovascular and respiratory disease (see references, following page). An absolute requirement is the ability of the lungs, middle ears and sinuses to equalize pressure. Any condition that risks the loss of consciousness should disqualify the applicant. Please proceed in accordance with the AAUS Medical Standards (Sec. 6.00). If you have questions about diving medicine, please consult with the Undersea Hyperbaric Medical Society or Divers Alert Network.

TESTS: THE FOLLOWING TESTS ARE REQUIRED:

DURING ALL INITIAL AND PERIODIC RE-EXAMS (UNDER AGE 40):

- Medical history
- Complete physical exam, with emphasis on neurological and 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 Assessment²

PHYSICIAN'S STATEMENT:

_____ 01 Diver **IS** medically qualified to dive for: _____ 2 years (over age 60)
_____ 3 years (age 40-59)
_____ 5 years (under age 40)

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

I have evaluated the abovementioned individual according to the American Academy of Underwater Sciences medical standards and required tests for scientific diving (Sec. 6.00 and Appendix 1) and, in my opinion, find no medical conditions that may be disqualifying for participation in scuba diving. I have discussed with the patient any medical condition(s) that would not disqualify him/her from diving but which may seriously compromise subsequent health. The patient understands the nature of the hazards and the risks involved in diving with these conditions.

Signature _____ MD or DO

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
 (To Be Completed By Applicant-Diver)

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

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

TO THE APPLICANT:

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

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

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

	Yes	No	Please indicate whether or not the following apply to you	Comments
1			Convulsions, seizures, or epilepsy	
2			Fainting spells or dizziness	
3			Been addicted to drugs	
4			Diabetes	
5			Motion sickness or sea/air sickness	
6			Claustrophobia	
7			Mental disorder or nervous breakdown	
8			Are you pregnant?	
9			Do you suffer from menstrual problems?	
10			Anxiety spells or hyperventilation	
11			Frequent sour stomachs, nervous stomachs or vomiting spells	
12			Had a major operation	
13			Presently being treated by a physician	
14			Taking any medication regularly (even non-prescription)	
15			Been rejected or restricted from sports	
16			Headaches (frequent and severe)	
17			Wear dental plates	
18			Wear glasses or contact lenses	
19			Bleeding disorders	
20			Alcoholism	
21			Any problems related to diving	
22			Nervous tension or emotional problems	

	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: _____

5. 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.

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

Buddy Breathing - 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 - Pressure at which a pressure containment device would fail structurally.

Certified Diver - A diver who holds a recognized valid certification from an organizational member or internationally 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 decompression 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.

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 - 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) - Group of individuals who act as the official representative of the membership organization in matters concerning the scientific diving program (Section 1.24).

Diving Safety Officer (DSO) - Individual responsible for the safe conduct of the scientific diving program of the membership organization (Section 1.20).

EAD - Equivalent Air Depth (see below).

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

Enriched Air (EAN_x) - 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 7.00).

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.

fN₂ - Fraction of nitrogen in a gas mixture, expressed as either a decimal or percentage, by volume.

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

FFW – Feet of freshwater, or equivalent static head.

FSW - Feet of seawater, or equivalent static head.

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

Maximum Working Pressure - 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 - MG

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

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

MSW - Meters of seawater or equivalent static head.

Nitrox - Any gas mixture comprised predominately of nitrogen and oxygen, most frequently containing between 21% and 40% oxygen. Also be referred to as Enriched Air Nitrox, abbreviated EAN.

NOAA Diving Manual: Refers to the *NOAA Diving Manual, Diving for Science and Technology*, 2001 edition. National Oceanic and Atmospheric Administration, Office of Undersea Research, US Department of Commerce.

No-Decompression limits - 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.

Oxygen Clean - All combustible contaminants have been removed.

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 Unit - OTU

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.

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.

pN₂ - Inspired partial pressure of nitrogen, usually expressed in units of atmospheres absolute.

pO₂ - Inspired partial pressure of oxygen, usually expressed in units of atmospheres absolute.

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

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

Recompression Chamber - see decompression chamber.

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.

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 - 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 - Normal pressure at which the system is designed to operate.

APPENDIX 6

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

Diver: _____

Date: _____

This letter serves to verify that the above listed person has met the training and pre-requisites as indicated below, and has completed all requirements necessary to be certified as a (Scientific Diver / Diver in Training) as established by the (Organizational Member) Diving Safety Manual, and has demonstrated competency in the indicated areas. (Organizational Member) is an AAUS OM and meets or exceeds all AAUS training requirements.

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

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

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

Please indicate any pertinent specialty certifications or training:

Emergency Information:

Name: _____ Relationship: _____
Telephone: _____ (work) _____ (home)
Address: _____

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

Diving Safety Officer:

(Signature) (Date)

(Print)

APPENDIX 7 DIVING EMERGENCY MANAGEMENT PROCEDURES

Introduction

A diving accident victim is defined as 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 Lead Diver in conjunction with the Diving Safety Office 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 and position and/or rescue as required.
2. Establish (A)irway, (B)reathing, (C)irculation, and (D)efibrillation as required.
3. Stabilize the victim.
4. Activate proper 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. Administer 100% oxygen, if appropriate (in cases of Decompression Illness, or Near Drowning).
6. If necessary contact Diver's Alert Network for the location of the nearest diving physician and operational recompression facility, etc.
7. Notify the USF Diving Safety Office, or the Director of Research Integrity and Compliance, Office of Research as deemed necessary. Notify the Emergency contact as deemed necessary.
8. Complete and submit USF Diving Incident Report Form (Appendix 8) to the USF Diving Safety Office.

Expedition Emergency Contact Numbers:

- United States Coast Guard – Channel 16 on Marine VHF Radio
- Local EMS telephone number - _____
- Individual Divers (at bottom of dive plan)

Nearest Medical Treatment Facility to Dive Site:

- Location: _____
- Telephone: _____

Nearest Recompression Facility to Dive Site:

- Location: _____
- Telephone: _____

Diver's Alert Network (DAN):

- **1-919-684-8111 or 1-800-326-3822**
 - 24 hour medical advise - If necessary call collect and state "I have a Medical Emergency"—Use to locate closest recompression chamber or physician consultations.

APPENDIX 8

USF Diving Injury/Incident Report Form

Required Incident Reporting: All diving incidents requiring recompression treatment, or resulting in moderate or serious injury, or death shall be reported the USF Diving Safety Office. The report will specify the circumstances of the incident and the extent of any injuries or illnesses. The Diving Control Board must review this report and release the appropriate information to the AAUS Statistics Committee. Use additional pages if necessary.

Principal Parties Involved:

Name: _____ Address: _____ Phone: _____ Email: _____

Simple Illness Referred to Physician Serious injury
Barotrauma Hyperbaric Treatment Near Drowning
Hyperoxic Hypercapnia Fatality
Other
Workers' Compensation Claim: Yes ___ No ___
Date of Incident: ___ / ___ / ___
Month Day Year

Summary of experience of divers involved: _____

Location: _____

Dive Site Description: _____

Description of conditions leading up to the incident: _____

Circumstances of incident and extent of any injuries or illnesses: _____

Description of symptoms, including depth and time of onset: _____

Description and results of treatment: _____

Recommendations to avoid repetition of incident: _____

Name & Title of Person Submitting Report: _____
(Please print)

Signature _____ Date ____ / ____ / ____

Mailing Address _____

Telephone _____ Email _____

APPENDIX 9 AAUS STATISTICS COLLECTION CRITERIA AND DEFINITIONS

COLLECTION CRITERIA:

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

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

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 into water, an underwater diving activity utilizing compressed gas, an ascent/return to the surface, and a surface interval of greater than 10 minutes.

Dives will not be differentiated as openwater or confined water dives. But openwater 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 divers home organization. Only a diver who has actually logged a dive during the reporting period is counted under this category.

Incident(s) occurring during the collection cycle. Only incidents occurring 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 other than air.

- Mixed Gas: Dives where the bottom gas used for the dive is a combination of oxygen, nitrogen, and helium (or other "exotic" 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 keep up with 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 the monitoring his/her own depth, time, and diving profile.
- Rebreathers: Dives where the breathing gas is repeatedly recycled in the 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, and 191->. Depths are in feet seawater. 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 requiring the use of multiple-tethered 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 shall 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 10
USF 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 mid-water)
- 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 11

University of South Florida

Diving Safety Program – Ben Meister * PED 214

Dive Plan

Date Submitted: _____ **Project ID Number:** _____
(not required)

Proposed Expedition Dates: _____ through _____

Dive Platform Name: _____
(vessel, lab or shore)

General Dive Site Location: _____
(ie: off Key Largo, off Clearwater)

Dive Plan Submitted By: _____

Principal Investigator: _____ **Lead Diver:** _____

Proposed No. of Dives: _____ **Proposed No. of Divers:** _____
(profile each dive on separate sheet) (List each diver with specifics on back)

Work Proposed: _____

Tools/Equipment Used: _____

Any Hazardous Conditions Anticipated: _____
(ie: cold water, extreme currents, extreme depths, low visibility)

Safety Precautions: _____
(ie: oxygen, chase vessel, dry suits)

Diving Roster:

Name	Level	Depth Certification
1. _____	<u>Lead Diver-Scientific Diver</u>	<u>fsw</u>
2. _____	_____	<u>fsw</u>
3. _____	_____	<u>fsw</u>
4. _____	_____	<u>fsw</u>
5. _____	_____	<u>fsw</u>
6. _____	_____	<u>fsw</u>
7. _____	_____	<u>fsw</u>
8. _____	_____	<u>fsw</u>
9. _____	_____	<u>fsw</u>
10. _____	_____	<u>fsw</u>

GENERAL DIVE PLAN CONSIDERATIONS

- Any diver has the right to refuse to dive without fear of penalty if s/he feels the conditions are unsafe or unfavorable **OR** the dive violates the precepts of their training **OR** the regulations of the USF Diving Safety Program.
- It is the responsibility of each diver to terminate the dive, without fear of penalty, whenever s/he feels it is unsafe to continue the dive, unless it compromises the safety of another diver already in the water.
- All Dive plans **MUST** be based on the competency of the least experienced diver.
- All Divers-in-training must be buddied with a Scientific Diver.
- **Absolutely No Solo Diving is allowed.**
- Depth certification levels may be extended only to the next deepest certification level and only if the diver with the limiting depth certification level is buddied with a diver certified to the deeper depth level.
- For all diving conducted under hazardous conditions a plan must be formulated to deal with such conditions.
- A Dive Profile **MUST** be completed for each proposed dive.(copy forms as needed)
- An Emergency Plan **MUST** be completed for each expedition including the following: emergency contact information (including name, relation and telephone number) for each diver, nearest recompression chamber, nearest accessible hospital and anticipated means of transportation.

Diving Accident Emergency Management Plan

A diving accident victim is 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 the expedition's Divemaster to develop procedures for such 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, and initiate the local Emergency Medical System (EMS) for transport to nearest medical facility. Explain the circumstances of the dive incident to the evacuation team, 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. **Rescue victim and/or position so the proper procedures may be initiated.**
2. **Establish (A)irway, (B)reathing and (C)irculation as required.**
3. **Administer 100% oxygen, if appropriate (in cases of Decompression Illness or Near Drowning).**
4. **Activate the local EMS for transport to the nearest appropriate medical facility. (the local EMS will vary from site to site – it must be stated in dive plan)**
5. **Contact the Diver's Alert Network as deemed necessary.**
6. **Contact Diving Safety Officer (DSO) and Emergency Contact Person, as deemed necessary.**
7. **Complete and submit Incident Report Form (in manual) to DSO.**

Expedition Emergency Contact Numbers:

- United States Coast Guard – Channel 16 on Marine VHF Radio
- Local EMS telephone number - _____

Nearest Medical Treatment Facility to Dive Site:

- Location: _____
- Telephone: _____

Nearest Recompression Facility to Dive Site:

- Location: _____
- Telephone: _____

Diver's Alert Network (DAN):

- **1-919-684-8111 or 1-800-326-3822**
- 24 hour medical advice—if necessary call collect and state “I have a Medical Emergency”—Use to locate closest recompression chamber or physician consultations.

Emergency Contact Information for Each Diver

Diver: _____ Diver No. 1

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

.....
c)

Diver: _____ Diver No. 2

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

.....
Diver: _____ Diver No. 3

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

.....
Diver: _____ Diver No. 4

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

Emergency Contact Information for Each Diver

Diver: _____ Diver No. 5

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

.....

Diver: _____ Diver No. 6

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

.....

Diver: _____ Diver No. 7

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

.....

Diver: _____ Diver No. 8

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

Diver: _____ Diver No. 9

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

.....

Diver: _____ Diver No. 10

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

.....

Diver: _____ Diver No. 11

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

.....

Diver: _____ Diver No. 12

Emergency Contact: _____ Relation: _____

Work Telephone: _____ Home Telephone: _____

Street Address: _____

City: _____ State: _____ Zip: _____

RELEASE AND WAIVER OF LIABILITY AGREEMENT

This agreement is executed on __ / __ / , by _____, City of _____, County of _____, State of _____, hereinafter referred to as "Releasor".

In consideration of the permission granted to Releasor by the University of South Florida (acting for and on behalf of the Board of Trustees) to participate in certain scientific research activities which activities shall consist, in whole or in part, of diving, both SCUBA and snorkeling, during a time period commencing on January 1, ____ and ending on December 31, _____, the receipt of which permission is hereby acknowledged, Releasor, for himself/herself and his/her personal representatives, heirs, next of kin, executors, administrators and assigns, hereby forever releases, waives, discharges and covenants not to sue the University of South Florida, the Florida Institute of Oceanography and the State of Florida, and their officers, agents, employees and members, (hereinafter referred to as "Releasee"), from any and all actions, causes of action, damages, claims, demands or liabilities, either in law or in equity, arising from or by reason of any bodily injury or personal injuries known or unknown, including death, and/or any property damage known or unknown which may occur as a result of or in connection with Releasor's participation in said activities.

Releasor hereby acknowledges that s/he has been fully advised of and has actual knowledge and conscious appreciation of the particular risks and dangers involved in said activities, including but not limited to those risks and dangers involved in traveling by automobile and/or boat to research locations, and being around and learning to use scientific research equipment, and spending periods exposed to the sun and weather, and possibly voyaging upon research vessels with its concomitant risks of motion sickness and grounding, and diving with SCUBA equipment, and all other risks and dangers naturally inherent in scientific research and other aspects of said activities, and Releasor hereby acknowledges that he/she elects voluntarily to fully assume all such risks and confront all such dangers.

Releasor realizes that he/she is responsible for any and all injury to persons or damage to property which may occur as a result of or in connection with his/her participation in said activities.

Releasor expressly agrees that this Agreement is intended to be as broad and inclusive as permitted by the laws of the State of Florida, and that if any portion thereof is held invalid, the balance shall, notwithstanding, continue in full legal force and effect.

Releasor hereby represents and warrants that s/he is at least 18 years of age, has carefully read this Agreement and understands all of its contents, and executes it voluntarily and with full knowledge of its significance.

IN WITNESS WHEREOF, Releasor has executed this Agreement at _____ on the date and year first above written.

Releasor's Signature - _____

Releasor's Printed Name - _____

APPENDIX 13
DIVEMASTER POST PROJECT DIVING REPORT

Expedition Start Date: _____ Expedition Completion Date: _____

This data is for the following date: _____

Location or Platform: _____

Principal Investigator: _____ Divemaster/Lead Diver: _____

General weather conditions: (circle each that applies)

Topside: clear cloudy rain mild storms severe storms

Sea state: flat calm < 2 ft 2ft – 4 ft 3ft – 5 ft > 5 ft

Underwater visibility: < 10 ft 10 ft – 20 ft 20 ft – 30 ft > 30 ft

In Water Currents: none mild moderate severe

Water Temperature: < 65 65 – 70 70 – 75 75 – 80 >80

Was all the proposed diving for this expedition completed? **Yes No**

If **No** please give the reason why they were not.

(rough seas, not needed, seasickness etc.)

Were the dives completed by the divers as listed in the dive plan? **Yes No**

If **No** please give the reason why they were not and explain what occurred in their place.

Were there any unusual incidents that occurred the DSO needs to be made aware of? (Diver problems, equipment problem, compressor problems etc.) **Yes No**

If yes please explain. Use additional paper if necessary.

**Please submit a completed log sheet for each
diver that dove during this expedition then
forward all paperwork to the DSO**