



**The Florida Institute of Technology  
and  
The American Academy of Underwater Sciences**

**STANDARDS FOR SCIENTIFIC DIVING**

## **FOREWORD**

Since 1951 the scientific diving community has endeavored to promote safe, effective diving through self-imposed diver training and education programs. Over the years, manuals for diving safety have been circulated between organizations, revised and modified for local implementation, and have resulted in an enviable safety record.

This document represents the minimal safety standards for scientific diving at the present day, as determined by the American Academy of Underwater Sciences (AAUS) and the Florida Institute of Technology (Florida Tech). The broader AAUS manual was modified to meet additional requirements and regulations of Florida Tech. Certain types of advanced diving practices allowed under AAUS are prohibited from Florida Tech diving operations, and specific university requirements have been added to the basic manual.

As diving science progresses so shall this standard, and it is the responsibility of every member of the AAUS and divers at Florida Tech to see that it always reflects state of the art, safe diving practice.

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# Volume 1

## Section 1.00 GENERAL POLICY

### 1.10 Scientific Diving Standards

#### Purpose

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

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

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

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

Additional standards that extend this document may be adopted by each AAUS organizational member, according to local procedure. The basic AAUS standard was thus modified to meet the specific requirements of the diving program at Florida Tech, resulting in more stringent limitations on diving activities and university-specific reporting requirements.

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

#### **1.20 Operational Control**

##### Florida Tech Auspices Defined

For the purposes of these standards the auspices of Florida Tech includes any scientific diving operation in which Florida Tech 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 Florida Tech or employees of auxiliary organizations, where such employees are acting within the scope of their employment, and the operations of other persons who are engaged in scientific diving of Florida Tech or are diving as members of an organization recognized by Florida Tech.

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

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

##### Florida Tech's Scientific Diving Standards and Safety Manual

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

- a) AAUS standards may be used as a set of minimal guidelines for the development of Florida Tech's scientific diving safety manual. Volume 1, Sections 1.00 through 6.00 and the Appendices are required for all manuals. Volume 2, Sections 7.00 through 9.00 are required only when Florida Tech conducts that diving activity. Florida Tech specific sections are placed in Volume 2.
- b) Emergency evacuation and medical treatment procedures.
- c) Criteria for diver training and certification.

- d) Standards written or adopted by reference for each diving mode utilized which include the following:
  - 1. Safety procedures for the diving operation.
  - 2. Responsibilities of the dive team members.
  - 3. Equipment use and maintenance procedures.
  - 4. Emergency procedures.

#### Diving Safety Officer

The Diving Safety Officer (DSO) serves as a member of the Diving Control Board (DCB) and oversees the Diving Program and Diving Control Board. The current Diving Safety Officer for Florida Tech is Mr. Tim Fletcher, Marine Operations: 321-727-7930 / [tfletcher@fit.edu](mailto:tfletcher@fit.edu)

##### a) Qualifications

- 1. Shall be appointed by the Provost of the Florida Institute of Technology, with the advice and counsel of the Diving Control Board.
- 2. Shall be trained as a scientific diver.
- 3. Shall be a full member as defined by AAUS.
- 4. Shall be an active underwater instructor from an internationally recognized certifying agency.

##### b) Duties and Responsibilities

- 1. Shall be responsible, through the DCB, to the Provost of the Florida Institute of Technology, for the conduct of the scientific diving program of Florida Tech. 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 Florida Tech, rests with the Diving Safety Officer.
- 2. May permit portions of this program to be carried out by a qualified delegate, although the Diving Safety Officer may not delegate responsibility for the safe conduct of the local diving program.
- 3. Shall be guided in the performance of the required duties by the advice of the DCB, but operational responsibility for the conduct of the local diving program will be retained by the Diving Safety Officer.
- 4. Shall suspend diving operations considered to be unsafe or unwise.
- 5. Updates the dive safety manual as needed and obtains approval of the Dive Control Board for the suggested changes.
- 6. Operates Florida Tech dive certification courses as needed (at least, once per semester unless special arrangements are made otherwise) and coordinates scheduling of the course with the Departments of Biological Sciences and Marine and Environmental Systems.

7. Reviews project approval forms and dive card applications and presents them to the dive control board for approval.
8. Maintains files on all student, employee and faculty divers diving under the auspices of the Florida Tech Dive Program.

## Diving Control Board

- a) The Diving Control Board (DCB) shall consist of a majority of active scientific divers and must contain at least five members. Voting members shall include the Diving Safety Officer, the responsible administrative officer, or designee, and should include other representatives of the diving program such as qualified divers and members selected by procedures established by Florida Tech. Dive control board members are appointed by the DSO with the approval of the Provost. A chairperson and a secretary may be chosen from the membership of the board according to local procedure. Current members are:

Mr. Tim Fletcher – Diving Safety Officer, Marine Operations  
Dr. Jon Shenker – Dive Control Board Chairman, Biological Sciences  
Dr. Richard Aronson - Biological Sciences  
Dr. Stephen Wood - Marine and Environmental Systems  
Mr. Anthony Jones - Marine and Environmental Systems  
Ms. Jennifer Hobbs – Biological Sciences  
Ms. Lauren Toth – Biological Sciences  
Dr. Steven Jachec - Marine and Environmental Systems  
Ms. Colleen Lindler - University Safety Office  
Dr. Robert Van Woesik – Biological Sciences

- b) Has autonomous and absolute authority over the scientific diving program's operation.
- c) Shall approve and monitor diving projects.
- d) Shall review and revise the diving safety manual.
- e) Shall assure compliance with the diving safety 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 Florida Tech 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, reissue, or the revocation of diving certifications.
- l) Shall recommend changes in policy and amendments to AAUS and Florida Tech's 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 of Florida Tech's diving safety manual.
- n) Shall suspend diving programs that are considered to be unsafe or unwise.
- o) Shall establish criteria for equipment selection and use.
- p) Shall recommend new equipment or techniques.
- q) Shall establish and/or approve facilities for the inspection and maintenance of diving and associated equipment.
- r) Shall ensure that Florida Tech's 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 Florida Tech's diving safety manual.

### Instructional Personnel

- a) Qualifications - All personnel involved in diving instruction under the auspices Florida Tech shall be qualified for the type of instruction being given.
- b) Selection - Instructional personnel will be selected by the DSO, or designee, who will solicit the advice of the DCB in conducting preliminary screening of applicants for instructional positions.

### Project Director

Dive Projects at Florida Tech will be conducted for purposes of research, academic classes, or dive training. The faculty member in charge of each research program, academic class, or dive training activity shall be designated as the Project Director, and shall be responsible for management of all aspects of the dive project. The Project Director shall be responsible for:

- a) Submission of a Project Approval Form (Appendix 10.1) to the DSO at least one week prior to the date of the first dive. If the DSO rejects the Project Approval Form, he will notify the Project Director and, when necessary, meet with all parties to determine if the project can be accomplished according to Florida Tech rules and regulations.
- b) The Project Director must verify with the Diving Safety Officer that the project has been approved and that a project approval number has been assigned.
- c) No deviations from the approved project will be allowed until such deviations have been submitted to and have received approval by the Diving Safety Officer.
- d) If the Project Director is not a diver or will not be present at the dive site, the Project Director shall appoint a Lead Diver who is then approved by the Diving Safety Officer. The Project Director is still responsible for management of all aspects of the dive project.
- e) At the end of each project, the Project Director must file an End of Project Form (Appendix 10.7). This form will summarize the diving operations and close out the project. Project Directors will not be issued approval numbers for new projects until End of Project forms have been completed for their previous projects.

### Lead Diver

For each dive, one individual shall be designated 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 operation. A certified diver is an individual who has been certified by an internationally recognized certifying organization and who has met all additional requirements for certification from Florida Tech.
- c) Planning dives in accordance with Section 2.20

- d) Ensuring safety and emergency equipment is in working order and at the dive site.
- e) Be in possession of Emergency Information Cards.
- f) 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 and DCB any physical problems or adverse physiological effects including symptoms of pressure-related injuries.
  - 6. Importance of compliance with all Florida Tech dive program regulations and maintenance of personal log books.

#### Reciprocity and Visiting Scientific Diver

- a) Two or more AAUS Organizational Members engaged jointly in diving activities, or engaged jointly in the use of diving resources, shall designate one of the participating Diving Control Boards to govern the joint dive project.
- b) A Scientific Diver from one Organizational Member shall apply for permission to dive under the auspices of another Organizational Member by submitting to the Diving Safety Officer of the host Organizational Member a document containing all the information described in Appendix 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 a host Organizational Member denies a visiting Scientific Diver permission to dive, the host 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

Florida Tech's Diving Control Board may grant a waiver for specific requirements of training, examinations, depth certification, and minimum activity to maintain certification.

#### **1.30 Consequence of Violation of Regulations by Scientific Divers**

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

#### **1.40 Consequences of Violation of Regulations by Organizational Members**

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

#### **1.50 Record Maintenance**

The 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 Florida Tech Diving Control Board, and other pertinent information deemed necessary.

Availability of Records:

- a) Medical 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 Florida Tech for the following period:
  - 1. Physician's written reports of medical examinations for dive team members - 5 years.
  - 2. Diving safety manual - current document only.
  - 3. Records of dive - 1 year, except 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.

## **SECTION 2.00 DIVING REGULATIONS FOR SCUBA (OPEN CIRCUIT, COMPRESSED AIR)**

### **2.10 Introduction**

No person shall engage in scientific diving operations under the auspices of the Florida Tech scientific diving program unless they hold a current Florida Tech certification issued pursuant to the provisions of this standard.

### **2.11 Application Procedures**

**2.11.1** The Project Director must file a Project Approval Form (Appendix 10.1) at least one week in advance of dive operations.

**2.11.2.** Each diver must complete the Florida Tech Diver Certification Program that is designed to meet both AAUS (Section 4.0, 5.0 and 6.0) and specific Florida Tech requirements (Appendix 10.2)

Divers must file a **Dive Card Application Package** as a Florida Tech Diver. Divers **cannot** dive on any Florida Tech project without possessing a current Florida Tech Dive Card. The Application Checklist (Appendix 10.2) indicates the documents that must be provided with the Dive Card Application Package and the procedures that must be completed before the Application Package can be approved. If the diver is a student, the application must be signed by the student's faculty advisor or coordinator.

**2.11.3** Upon successful completion of the application process, the diver will be issued a Florida Tech Dive Card and approval as an AAUS Diver In Training or Scientific Diver status.

### **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 Florida Tech, the lead diver for a proposed operation must formulate a dive plan that should include the following:

- a) Divers qualifications, and the type of certificate or certification held by each diver.
- b) 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. Nearest operational decompression chamber.
  3. Nearest accessible hospital.
  4. Available means of transport.
- c) Approximate number of proposed dives.
- d) Location(s) of proposed dives.
- e) Estimated depth(s) and bottom time(s) anticipated.
- f) Decompression status and repetitive dive plans, if required.
- g) Proposed work, equipment, and boats to be employed.

- h) 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, of this standard, or the Florida Tech diving safety manual.
  3. No dive team member shall be required to be exposed to hyperbaric conditions against their will, except when necessary to prevent or treat a pressure-related injury.
  4. No dive team member shall be permitted to dive for the duration of any known condition, which is likely to adversely affect the safety and health of the diver or other dive members.
- 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.

### **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, 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 this standard.

#### Termination of the Dive

- a) It is the responsibility of the diver to terminate the dive, without fear of penalty, whenever they feel it is unsafe to continue the dive, unless it compromises the safety of another diver already in the water.
- b) The dive shall be terminated while there is still sufficient cylinder pressure to permit the diver to safely reach the surface, including decompression time, or to safely reach an additional air source at the decompression station. Planned decompression diving is NOT permitted while diving under the auspices of the Florida Tech dive program.

## Emergencies and Deviations from Regulations

Any diver may deviate from the requirements of this standard 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 Control Board 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 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 transport them to a decompression chamber if necessary. Planned decompression diving is NOT allowed while diving under the auspices of the Florida Tech dive program.

### 2.50 Emergency Procedures

Each organizational member will develop emergency procedures which follow the standards of care of the community and must include procedures for emergency care, recompression and evacuation for each dive location (Appendix 7).

### 2.60 Flying After Diving or Ascending to Altitude (Over 1000 feet)

Following a Single No-Decompression Dive: Divers should have a minimum preflight surface interval of 12 hours.

Following Multiple Dives per Day or Multiple Days of Diving: Divers should have a minimum preflight surface interval of 18 hours.

Following Dives Requiring Decompression Stops: Divers should have a minimum preflight surface interval of 24 hours. Planned decompression diving is NOT allowed while diving under the auspices of the Florida Tech dive program.

Before ascending to Altitude above (1000 feet) by Land Transport: Divers should follow the appropriate guideline for preflight surface intervals unless the decompression procedure used has accounted for the increase in elevation.

### 2.70 Record Keeping Requirements

#### Personal Diving Log

Each certified scientific diver or diver in training shall log every dive made under the auspices of the Florida Tech dive program, and is encouraged to log all other dives. Log sheets (Appendix 10.6) shall be completed and submitted electronically at <http://fit.diveaus.com/> within one week following completion of a dive(s) (when practical) to be placed in the diver's permanent file. The diving log shall include at least the following:

- a) Name of diver, buddy, and Lead Diver.
- b) Date, time, and location.
- c) Diving modes used.
- d) General nature of diving activities.
- e) Approximate surface and underwater conditions.

- f) Maximum depths, bottom time, and surface interval time.
- g) Diving tables or computers used.
- h) Detailed report of any near or actual incidents.

#### Required Incident Reporting

All diving incidents requiring recompression treatment, or resulting in moderate or serious injury, or death shall be reported to the Florida Tech Diving Control Board. The report will specify the circumstances of the incident and the extent of any injuries or illnesses. The Florida Tech Dive Control Board will forward a copy of the report to the AAUS.

Additional information must meet the following reporting requirements:

- a) Florida Tech will record and report occupational injuries and illnesses in accordance with requirements of the appropriate Labor Code section.
- b) If pressure-related injuries are suspected, or if symptoms are evident, the following additional information shall be recorded and retained by Florida Tech, with the record of the dive, for a period of 5 years:
  - 1. Complete AAUS Incident Report at <http://www.aaus.org>.
  - 2. Written descriptive report to include:
    - Name, address, phone numbers of the principal parties involved.
    - Summary of experience of divers involved.
    - Location, description of dive site, and description of conditions that led up to incident.
    - Description of symptoms, including depth and time of onset.
    - Description and results of treatment.
    - Disposition of case.
    - Recommendations to avoid repetition of incident.
- c) The Florida Tech Dive Control Board 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.

## SECTION 3.00 DIVING EQUIPMENT

### 3.10 General Policy

All equipment shall meet standards as determined by the Diving Safety Officer and the Diving Control Board. Equipment that is subjected to extreme usage under adverse conditions should require more frequent testing and maintenance. If any of the dive gear is rented, it must be rented from a certified dive shop that rigidly adheres to appropriate maintenance and inspection procedures. All equipment must be in good serviceable condition, deficiencies require the cancelation or termination of the dive. All equipment problems must be brought to the attention of the Project Director/Lead Diver.

### 3.20 Equipment

#### Regulators

- a) Only those makes and models specifically approved by the Diving Safety Officer and the Diving Control Board shall be used.
- b) Scuba regulators shall be inspected and tested prior to first use and every 12 months thereafter.
- c) Regulators will consist of a primary second stage and an alternate air source (such as an octopus second stage or redundant air supply).

#### 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.

#### Gauges

Gauges shall be inspected and tested before first use and every 12 months thereafter.

## Flotation Devices

- a) Each diver shall have the capability of achieving and maintaining positive buoyancy.
- b) Personal flotation systems, buoyancy compensators, dry suits, or other variable volume buoyancy compensation devices shall be equipped with an exhaust valve.
- c) These devices shall be functionally inspected and tested at intervals not to exceed 12 months.

## Timing Devices, Depth, and Pressure Gauges

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

## Determination of Decompression Status: Dive Tables, Dive Computers

- a) A set of diving tables, approved by the Diving Control Board, must be available at the dive location. Florida Tech recognizes PADI dive tables for all divers operating under the auspices of the Florida Tech dive program.
- b) Dive computers may be utilized in addition to approved diving tables and must be approved by the dive control board. AAUS/Florida Tech recommendations on dive computers are located in appendix 8.

### **3.30 Auxiliary Equipment**

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

### **3.40 Support Equipment**

#### First aid supplies

A first aid kit and emergency oxygen shall be available on all Florida Tech Dive functions. The DSO maintains kits that may be checked out for approved projects.

#### 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. Standardized red and white "diver down" flags are required for all Florida Tech approved dive activities. In addition, the international "alpha" flag is required to be displayed as deemed appropriate by the dive safety officer. The DSO maintains dive flags that may be checked out for approved projects.

#### Compressor Systems – Florida Tech Controlled

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

Proof of proper maintenance of personal and project owned dive equipment is mandatory and each diver is ultimately responsible for the maintenance of their own diving equipment. All diving equipment shall be inspected by the diver for proper functioning at the beginning and end of the diving day. Any equipment item that fails to function in a satisfactory fashion must be immediately removed from use until it has been inspected and/or repaired as necessary to return it to a serviceable condition. All equipment overhauls must be performed by an individual or facility certified to conduct those maintenance procedures. Receipts from a dive store attesting to maintenance checks should be provided to the DSO as soon as possible. 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 breathing air compressor controlled by Florida Tech, 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	
Component	Maximum
Oxygen	20 - 22%/v
Carbon Monoxide	10 PPM/v
Carbon Dioxide	1000 PPM/v

Condensed Hydrocarbons	5 mg/m <sup>3</sup>
Total Hydrocarbons as Methane	25 PPM/v
Water Vapor ppm	(2)
Objectionable Odors	None

For breathing air used in conjunction with self-contained breathing apparatus in extreme cold where moisture can condense and freeze, causing the breathing apparatus to malfunction, a dew point not to exceed -50°F (63 pm v/v) or 10 degrees lower than the coldest temperature expected in the area is required.

## **SECTION 4.00 ENTRY-LEVEL TRAINING REQUIREMENTS**

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

### **4.10 Evaluation**

#### Medical Examination

The applicant for training shall be certified by a licensed physician to be medically qualified for diving before proceeding with the training as designated in Section 4.20 (Section 6.00 and Appendices 1 through 4).

#### Swimming Evaluation

Applicant shall successfully perform the following tests, or equivalent, in the presence of the Diving Safety Officer, or an examiner approved by the Diving Safety Officer.

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

### **4.20 Scuba Training**

#### Practical Training

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

- a) Enter water with full equipment. For “giant stride” entries, the confined water facility must provide adequate safety assurances as determined by the dive safety officer.
- b) Clear face mask.
- c) Demonstrate air sharing, including both buddy breathing and the use of alternate air source, as both donor and recipient, with and without a face mask.
- d) Demonstrate ability to alternate between snorkel and scuba while kicking.
- e) Demonstrate understanding of underwater signs and signals.
- f) Demonstrate simulated in-water mouth-to-mouth resuscitation.
- g) Rescue and transport, as a diver, a passive simulated victim of an accident.
- h) Demonstrate ability to remove and replace equipment while submerged.
- i) Demonstrate watermanship ability, which is acceptable to the instructor.

## Written Examination

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

- a) Function, care, use, and maintenance of diving equipment.
- b) Physics and physiology of diving.
- c) Diving regulations and precautions.
- d) Near-shore currents and waves.
- e) Dangerous marine animals.
- f) Emergency procedures, including buoyant ascent and ascent by air sharing.
- g) Currently accepted decompression procedures.
- h) Demonstrate the proper use of dive tables.
- i) Underwater communications.
- j) Aspects of freshwater and altitude diving.
- k) Hazards of breath-hold diving and ascents.
- l) Planning and supervision of diving operations.
- m) Diving hazards.
- n) Cause, symptoms, treatment, and prevention of the following: near drowning, air embolism, carbon dioxide excess, squeezes, oxygen poisoning, nitrogen narcosis, exhaustion and panic, respiratory fatigue, motion sickness, decompression sickness, hypothermia, and hypoxia/anoxia.

## Open Water Evaluation

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

- a) Surface dive to a depth of 10 feet in open water without scuba.
- b) Demonstrate proficiency in air sharing as both donor and receiver.
- c) Enter and leave open water or surf, or leave and board a diving vessel, while wearing scuba gear.
- d) Kick on the surface 400 yards while wearing scuba gear, but not breathing from the scuba unit.
- e) Demonstrate judgment adequate for safe diving.
- f) Demonstrate, where appropriate, the ability to maneuver efficiently in the environment, at and below the surface.
- g) Complete a simulated emergency swimming ascent.
- h) Demonstrate clearing of mask and regulator while submerged.
- i) Demonstrate ability to achieve and maintain neutral buoyancy while submerged.
- j) Demonstrate techniques of self-rescue and buddy rescue.
- k) Navigate underwater.
- l) Plan and execute a dive.
- m) Successfully complete 5 open water dives for a minimum total time of 3 hours, of which 1-1/2 hours cumulative bottom time must be on scuba. No more than 3 training dives shall be made in any 1 day.

## SECTION 5.00 SCIENTIFIC DIVER CERTIFICATION

### 5.10 Certification Types

#### Scientific Diver Certification

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

#### Temporary Diver Permit

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

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

### 5.20 General Policy

No person shall engage in scientific diving unless that person is authorized by Florida Tech, pursuant to the provisions of this standard. Only a person diving under the auspices of the Florida Tech Dive Program that subscribes to the practices of AAUS is eligible for a scientific diver certification.

### 5.30 Requirements For Scientific Diver Certification

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

#### Prerequisites

- a) Application - Divers must file with the DSO, an **Application for Dive Card Approval** (Appendix 10.1, 10.2) as a Florida Tech Diver. Divers **cannot** dive on any Florida Tech project without possessing a current Florida Tech Dive Card.
- b) Medical approval. Each applicant for diver certification shall submit a statement from a licensed physician, based on an approved medical examination, attesting to the applicant's fitness for diving (Section 6.00 and Appendices 1 through 4).
- c) Scientific Diver-In-Training Permit - This permit signifies that a diver has completed and been certified as at least an open water diver through an internationally recognized certifying agency or scientific diving program, and has the knowledge skills and experience equivalent to that gained by successful completion of training as specified in Section 4.00.

## Theoretical and Practical Training

The diver must complete theoretical aspects and practical training for a minimum cumulative time of 100 hours. Theoretical aspects shall include principles and activities appropriate to the intended area of scientific study. The diver must maintain a log of the training activities and certifications to be presented upon completion.

- a) Required Topics (include, but not limited to):
1. Diving Emergency Care Training
    - Cardiopulmonary Resuscitation (CPR)
    - Standard or Basic First Aid
    - Recognition of DCS and AGE
    - Accident Management
    - Field Neurological Exam
    - Oxygen Administration
  2. Dive Rescue
  3. Dive Physics
  4. Dive Physiology
  5. Dive Environments
  6. Decompression Theory and its Application
  7. AAUS Scientific Diving Regulations and History
    - Scientific Dive Planning
    - Coordination with other Agencies
    - Appropriate Governmental Regulations
  8. Scientific Method
  9. Data Gathering Techniques (Only Items specific to area of study are required)
    - Transect Sampling (Quadrating)
    - Transecting
    - Mapping
    - Coring
    - Photography
    - Tagging
    - Collecting
    - Animal Handling
    - Archaeology

- Common Biota
  - Organism Identification
  - Behavior
  - Ecology
- Site Selection, Location, and Re-location
- Specialized Equipment for data gathering
- HazMat Training
- HP Cylinders
- Chemical Hygiene, Laboratory Safety (Use Of Chemicals)

b) Suggested Topics (include, but not limited to):

1. Specific Dive Modes (methods of gas delivery)
  - Open Circuit
  - Hooka
  - Surface Supplied diving
2. Small Boat Operation
3. Rebreathers
  - Closed
  - Semi-closed
4. Specialized Breathing Gas
  - Nitrox
  - Mixed Gas
5. Specialized Environments and Conditions
  - Blue Water Diving,
  - 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 (Live-boating)
  - Potential Entanglement
6. Specialized Diving Equipment
  - Full face mask
  - Dry Suit
  - Communications

c) Practical training must include a checkout dive, with evaluation of the skills listed in Section 4.20 (Open Water Evaluation), with the DSO or qualified delegate followed by at least 11 ocean or open water dives in a variety of dive sites and diving conditions, for a cumulative bottom time of 6 hours. Dives following the checkout dive must be

supervised by a certified Scientific Diver with experience in the type of diving planned, with the knowledge and permission of the DSO.

- d) Examinations
  1. Written examination
    - General exam required for scientific diver certification.
    - Examination covering the suggested topics at the DSO's discretion.
  2. Examination of equipment.
    - Personal diving equipment
    - Task specific equipment

#### **5.40 Depth Certifications**

##### Depth Certifications and Progression to Next Depth Level

A certified diver diving under the auspices of the Florida Tech Dive Program may progress to the next depth level after successfully completing the required dives for the next level. Under these circumstances the diver may exceed their depth limit. Dives shall be planned and executed under close supervision of a diver certified to this depth, with the knowledge and permission of the DSO.

- a) Certification to 30 Foot Depth - Initial permit level, approved upon the successful completion of training listed in Section 4.00 and 5.30.
- b) Certification to 60 Foot Depth - A diver holding a 30 foot certificate may be certified to a depth of 60 feet after successfully completing, under supervision, 12 logged training dives to depths between 31 and 60 feet, for a minimum total time of 4 hours.
- c) Certification to 100 Foot Depth - A diver holding a 60 foot certificate may be certified to a depth of 100 feet after successfully completing, 4 dives to depths between 61 and 100 feet. The diver shall also demonstrate proficiency in the use of the appropriate Dive Tables.
- d) Certification to 130 Foot Depth - A diver holding a 100 foot certificate may be certified to a depth of 130 feet after successfully completing, 4 dives to depths between 100 and 130 feet. The diver shall also demonstrate proficiency in the use of the appropriate Dive Tables.
- e) Certification to 150 Foot Depth - A diver holding a 130 foot certificate may be certified to a depth of 150 feet after successfully completing, 4 dives to depths between 130 and 150 feet. The diver must also demonstrate knowledge of the special problems of deep diving, and of special safety requirements.
- f) Certification to 190 Foot Depth - A diver holding a 150 foot certificate may be certified to a depth of 190 feet after successfully completing, 4 dives to depths between 150 and 190 feet. The diver must also demonstrate knowledge of the special problems of deep diving, and of special safety requirements.

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

## **5.50 Continuation of Certificate**

### Minimum Activity to Maintain Certification

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

### Re-qualification of Depth Certificate

- a) Once the initial certification requirements of Section 5.30 are met, divers whose depth certification has lapsed due to lack of activity may be re-qualified by procedures adopted by the DSO and DCB. These procedures will include a checkout dive, with evaluation of the skills listed in Section 4.20 (Open Water Evaluation), with the DSO or qualified delegate. To complete their recertification, divers must then conduct at least 11 ocean or open water dives in a variety of dive sites and diving conditions, for a cumulative bottom time of 6 hours, as specified for divers-in-training. Dives following the checkout dive must be supervised by a certified Scientific Diver with experience in the type of diving planned, with the knowledge and permission of the DSO.

### Medical Examination

All certified scientific divers shall pass a medical examination at the intervals specified in Section 6.10. After each major illness or injury, as described in Section 6.10, 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/First Aid/AED (must be current).
- Emergency oxygen administration (must be current)
- First aid for diving accidents (must be current)
- First aid for hazardous marine life injuries (must be current)
- On-site/field neurological assessment for divers (must be current)

## **5.60 Revocation of Certification**

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

## **5.70 Recertification**

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

## SECTION 6.00 MEDICAL STANDARDS

### 6.10 Medical Requirements

#### General

- a) The DSO shall determine that divers have passed a current diving physical examination and have been declared by the examining physician to be fit to engage in diving activities as may be limited or restricted in the medical evaluation report.
- b) All medical evaluations required by this standard shall be performed by, or under the direction of, a licensed physician of the applicant-diver's choice, preferably one trained in diving/undersea medicine.
- c) The diver should be free of any chronic disabling disease and be free of any conditions contained in the list of conditions for which restrictions from diving are generally recommended. (Appendix 1)

#### Frequency of Medical Evaluations

Medical evaluation shall be completed:

- a) Before a diver may begin diving, unless an equivalent initial medical evaluation has been given within the preceding 5 years (3 years if over the age of 40, 2 years if over the age of 60), the member organization has obtained the results of that examination, and those results have been reviewed and found satisfactory by the DSO/DCB.
- b) Thereafter, at 5 year intervals up to age 40, every 3 years after the age of 40, and every 2 years after the age of 60.
- c) Clearance to return to diving must be obtained from a physician following any major injury or illness, or any condition requiring hospital care. If the injury or illness is pressure related, then the clearance to return to diving must come from a physician trained in diving medicine.

#### Information Provided Examining Physician

The Florida Tech DSO/DCB shall provide a copy of the medical evaluation requirements of this standard to the examining physician. (Appendices 1, 2, and 3).

#### Content of Medical Evaluations

Medical examinations conducted initially and at the intervals specified in Section 6.10 shall consist of the following:

- a) Applicant agreement for release of medical information to the Diving Safety Officer and the DCB (Appendix 2).
- b) Medical history (Appendix 3).
- c) Diving physical examination (Required tests listed below and in Appendix 2).

## Conditions Which May Disqualify Candidates From Diving (Adapted from Bove, 1998)

- a) Abnormalities of the tympanic membrane, such as perforation, presence of a monomeric membrane, or inability to auto inflate the middle ears.
- b) Vertigo including Meniere's Disease.
- c) Stapedectomy or middle ear reconstructive surgery.
- d) Recent ocular surgery.
- e) Psychiatric disorders including claustrophobia, suicidal ideation, psychosis, anxiety states, untreated depression.
- f) Substance abuse, including alcohol.
- g) Episodic loss of consciousness.
- h) History of seizure.
- i) History of stroke or a fixed neurological deficit.
- j) Recurring neurologic disorders, including transient ischemic attacks.
- k) History of intracranial aneurysm, other vascular malformation or intracranial hemorrhage.
- l) History of neurological decompression illness with residual deficit.
- m) Head injury with sequelae.
- n) Hematologic disorders including coagulopathies.
- o) Evidence of coronary artery disease or high risk for coronary artery disease.
- p) Atrial septal defects.
- q) Significant valvular heart disease - isolated mitral valve prolapse is not disqualifying.
- r) Significant cardiac rhythm or conduction abnormalities.
- s) Implanted cardiac pacemakers and cardiac defibrillators (ICD).
- t) Inadequate exercise tolerance.
- u) Severe hypertension.
- v) History of spontaneous or traumatic pneumothorax.
- w) Asthma.
- x) Chronic pulmonary disease, including radiographic evidence of pulmonary blebs, bullae or cysts.
- y) Diabetes mellitus.
- z) Pregnancy.

## Laboratory Requirements for Diving Medical Evaluation and Intervals.

- a) Initial examination under age 40:
  - \* Medical History
  - \* Complete Physical Exam, emphasis on neurological and otological components
  - \* Chest X-ray
  - \* Spirometry
  - \* Hematocrit or Hemoglobin
  - \* Urinalysis
  - \* Any further tests deemed necessary by the physician.
- b) Periodic re-examination under age 40 (every 5 years):
  - \* Medical History
  - \* Complete Physical Exam, emphasis on neurological and otological components
  - \* Hematocrit or Hemoglobin
  - \* Urinalysis
  - \* Any further tests deemed necessary by the physician

- c) Initial exam over age 40:
- \* Medical History
  - \* Complete Physical Exam, emphasis on neurological and otological components
  - \* Assessment of coronary artery disease using Multiple-Risk-Factor Assessment<sup>1</sup> (age, lipid profile, blood pressure, diabetic screening, smoker)
  - \* Resting EKG
  - \* Chest X-ray
  - \* Spirometry
  - \* Urinalysis
  - \* Hematocrit or Hemoglobin
  - \* Any further tests deemed necessary by the physician
  - \* Exercise stress testing may be indicated based on risk factor assessment.<sup>2</sup>
- d) Periodic re-examination over age 40 (every 3 years); over age 60 (every 2 years):
- \* Medical History
  - \* Complete Physical Exam, emphasis on neurological and otological components
  - \* Assessment of coronary artery disease using Multiple-Risk-Factor Assessment<sup>1</sup> (age, lipid profile, blood pressure, diabetic screening, smoker)
  - \* Resting EKG
  - \* Urinalysis
  - \* Hematocrit or Hemoglobin
  - \* Any further tests deemed necessary by the physician
  - \* Exercise stress testing may be indicated based on risk factor assessment.<sup>2</sup>
- e) Physician's Written Report
1. After any medical examination relating to the individual's fitness to dive, the Florida Tech DSO/DCB shall obtain a written report prepared 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. This will be reviewed by the DCB.
  2. The Florida Tech DSO/DCB shall make a copy of the physician's written report available to the individual.

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<sup>1</sup> "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>

<sup>2</sup> Gibbons RJ, et al. 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). Journal of the American College of Cardiology. 30:260-311, 1997. <http://www.acc.org/clinical/guidelines/exercise/exercise.pdf>

# **Volume 2**

**Sections 7.00 through 12.00  
Required Only When Conducting Described Diving Activities  
and  
Florida Tech Specific Sections**

## SECTION 7.00 NITROX DIVING GUIDELINES

The following guidelines address the use of nitrox by scientific divers conducting dive activities under the auspices of the Florida Tech dive program. 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.

### 7.10 Prerequisites

#### Eligibility

Only a certified Scientific Diver or Scientific Diver In Training (Sections 4.00 and 5.00) diving under the auspices of Florida Tech is eligible for authorization to use nitrox. After completion, review and acceptance of application materials, training and qualification, an applicant will be authorized to use nitrox within their depth authorization, as specified in Section 5.40.

#### Application and Documentation

Application and documentation for authorization to use nitrox should be made on forms specified by the Diving Control Board.

### 7.20 Requirements for Authorization to Use Nitrox

Submission of documents and participation in aptitude examinations does not automatically result in authorization to use nitrox. The applicant must convince the DSO and members of the DCB that they are sufficiently skilled and proficient. The signature of the DSO on the authorization form will acknowledge authorization. After completion of training and evaluation, authorization to use nitrox may be denied to any diver who does not demonstrate to the satisfaction of the DSO or DCB the appropriate judgment or proficiency to ensure the safety of the diver and dive buddy.

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

#### Training

The diver must complete additional theoretical and practical training beyond the Scientific Diver In Training air certification level, to the satisfaction of the Florida Tech DSO and DCB (Section 7.30).

#### Examinations

Each diver should demonstrate proficiency in skills and theory in written, oral, and practical examinations covering:

- a) Written examinations covering the information presented in the classroom training session(s) (i.e., gas theory, oxygen toxicity, partial pressure determination, etc.);
- b) Practical examinations covering the information presented in the practical training session(s) (i.e., gas analysis, documentation procedures, etc.);
- c) Openwater checkout dives, to appropriate depths, to demonstrate the application of theoretical and practical skills learned.

#### 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.

### 7.30 Nitrox Training Guidelines

Training in these guidelines should be in addition to training for Diver-In-Training authorization (Section 4.00). It may be included as part of training to satisfy the Scientific Diver training requirements (Section 5.30).

#### Classroom Instruction

- d) Topics should include, but are not limited to: review of previous training; physical gas laws pertaining to nitrox; partial pressure calculations and limits; equivalent air depth (EAD) concept and calculations; oxygen physiology and oxygen toxicity; calculation of oxygen exposure and maximum safe operating depth (MOD); determination of decompression schedules (both by EAD method using approved air dive tables, and using approved nitrox dive tables); dive planning and emergency procedures; mixing procedures and calculations; gas analysis; personnel requirements; equipment marking and maintenance requirements; dive station requirements.
- e) DCB may choose to limit standard nitrox diver training to procedures applicable to diving, and subsequently reserve training such as nitrox production methods, oxygen cleaning, and dive station topics to divers requiring specialized authorization in these areas.

#### Practical Training

The practical training portion will consist of a review of skills as stated for scuba (Section 4.00), with additional training as follows:

- a) Oxygen analysis of nitrox mixtures.
- b) Determination of MOD, oxygen partial pressure exposure, and oxygen toxicity time limits, for various nitrox mixtures at various depths.
- c) Determination of nitrogen-based dive limits status by EAD method using air dive tables, and/or using nitrox dive tables, as approved by the DCB.
- d) Nitrox dive computer use may be included, as approved by the DCB.

#### Written Examination (based on classroom instruction and practical training)

Before authorization, the trainee should successfully pass a written examination demonstrating knowledge of at least the following:

- a) Function, care, use, and maintenance of equipment cleaned for nitrox use.
- b) Physical and physiological considerations of nitrox diving (ex.: O<sub>2</sub> and CO<sub>2</sub> toxicity).
- c) Diving regulations and procedures as related to nitrox diving, either scuba or surface-supplied (depending on intended mode).
- d) Given the proper information, calculation of:
  - 1. Equivalent air depth (EAD) for a given  $f_{O_2}$  and actual depth;
  - 2.  $p_{O_2}$  exposure for a given  $f_{O_2}$  and depth;
  - 3. Optimal nitrox mixture for a given  $p_{O_2}$  exposure limit and planned depth;
  - 4. Maximum operational depth (MOD) for a given mix and  $p_{O_2}$  exposure limit;
  - 5. For nitrox production purposes, percentages/psi of oxygen present in a given mixture, and psi of each gas required to produce a  $f_{O_2}$  by partial pressure mixing.
- e) Dive table and dive computer selection and usage;

- f) Nitrox production methods and considerations.
- g) Oxygen analysis.
- h) Nitrox operational guidelines (Section 7.40), dive planning, and dive station components.

#### Openwater Dives

A minimum of two supervised open water dives using nitrox is required for authorization. The mode used in the dives should correspond to the intended application (i.e., scuba or surface-supplied). If the MOD for the mix being used can be exceeded at the training location, direct, in-water supervision is required.

#### Surface-Supplied Training

All training as applied to surface-supplied diving (practical, classroom, and openwater) will follow the member organization's surface-supplied diving standards, including additions listed in Section 11.60.

### **7.40 Scientific Nitrox Diving Regulations**

#### Dive Personnel Requirements

- a) Nitrox Diver In Training - A Diver In Training, who has completed the requirements of Section 4.00 and the training and authorization sections of these guidelines, may be authorized by the DSO to use nitrox under the direct supervision a Scientific Diver who also holds nitrox authorization. Dive depths should be restricted to those specified in the diver's authorization.
- b) Scientific Diver - A Scientific Diver who has completed the requirements of Section 5.00 and the training and authorization sections of these guidelines, may be authorized by the DSO to use nitrox. Depth authorization to use nitrox should be the same as those specified in the diver's authorization, as described in Section. 5.40.
- c) Lead Diver - On any dive during which nitrox will be used by any team member, the Lead Diver should be authorized to use nitrox, and hold appropriate authorizations required for the dive, as specified in AAUS Standards. Lead Diver authorization for nitrox dives by the DSO and/or DCB should occur as part of the dive plan approval process.

In addition to responsibilities listed in Section 1.20, the Lead Diver should:

1. As part of the dive planning process, verify that all divers using nitrox on a dive are properly qualified and authorized;
2. As part of the pre-dive procedures, confirm with each diver the nitrox mixture the diver is using, and establish dive team maximum depth and time limits, according to the shortest time limit or shallowest depth limit among the team members.
3. The Lead Diver should also reduce the maximum allowable pO<sub>2</sub> exposure limit for the dive team if on-site conditions so indicate (see Sec. 7.42.).

## Dive Parameters

### a) Oxygen Exposure Limits

1. The inspired oxygen partial pressure experienced at depth should not exceed 1.6 ATA. All dives performed using nitrox breathing mixtures should comply with the current *NOAA Diving Manual* "Oxygen Partial Pressure Limits for 'Normal' Exposures"
2. The maximum allowable exposure limit should be reduced in cases where cold or strenuous dive conditions, or extended exposure times are expected. The DCB should consider this in the review of any dive plan application, which proposes to use nitrox. The Lead Diver should also review on-site conditions and reduce the allowable pO<sub>2</sub> exposure limits if conditions indicate.
3. If using the equivalent air depth (EAD) method the maximum depth of a dive should be based on the oxygen partial pressure for the specific nitrox breathing mix to be used.

### b) Bottom Time Limits

1. Maximum bottom time should be based on the depth of the dive and the nitrox mixture being used.
2. Bottom time for a single dive should not exceed the NOAA maximum allowable "Single Exposure Limit" for a given oxygen partial pressure, as listed in the current NOAA Diving Manual.

### c) Dive Tables and Gases

1. A set of DCB approved nitrox dive tables should be available at the dive site.
2. When using the equivalent air depth (EAD) method, dives should be conducted using air dive tables approved by the DCB.
3. If nitrox is used to increase the safety margin of air-based dive tables, the MOD and oxygen exposure and time limits for the nitrox mixture being dived should not be exceeded
4. Breathing mixtures used while performing in-water decompression, or for bail-out purposes, should contain the same or greater oxygen content as that being used during the dive, within the confines of depth limitations and oxygen partial pressure limits set forth in Section 7.40 Dive Parameters.

- d) Nitrox Dive Computers
1. Dive computers may be used to compute decompression status during nitrox dives. Manufacturers' guidelines and operations instructions should be followed.
  2. Use of Nitrox dive computers should comply with dive computer guidelines included in the AAUS Standards.
  3. Nitrox dive computer users should demonstrate a clear understanding of the display, operations, and manipulation of the unit being used for nitrox diving prior to using the computer, to the satisfaction of the DSO or designee.
  4. If nitrox is used to increase the safety margin of an air-based dive computer, the MOD and oxygen exposure and time limits for the nitrox mixture being dived should not be exceeded.
  5. Dive computers capable of pO<sub>2</sub> limit and fO<sub>2</sub> adjustment should be checked by the diver prior to the start each dive to assure compatibility with the mix being used.
- e) Repetitive Diving
1. Repetitive dives using nitrox mixtures should be performed in compliance with procedures required of the specific dive tables used.
  2. Residual nitrogen time should be based on the EAD for the specific nitrox mixture to be used on the repetitive dive, and not that of the previous dive.
  3. The total cumulative exposure (bottom time) to a partial pressure of oxygen in a given 24 hour period should not exceed the current *NOAA Diving Manual* 24-hour Oxygen Partial Pressure Limits for "Normal" Exposures.
  4. When repetitive dives expose divers to different oxygen partial pressures from dive to dive, divers should account for accumulated oxygen exposure from previous dives when determining acceptable exposures for repetitive dives. Both acute (CNS) and chronic (pulmonary) oxygen toxicity concerns should be addressed.
- f) Oxygen Parameters
1. Authorized Mixtures - Mixtures meeting the criteria outlined in Section 7.40 may be used for nitrox diving operations, upon approval of the DCB.
  2. Purity - Oxygen used for mixing nitrox-breathing gas should meet the purity levels for "Medical Grade" (U.S.P.) or "Aviator Grade" standards.
- In addition to the AAUS Air Purity Guidelines (Section 3.60), the following standard should be met for breathing air that is either:
- a. Placed in contact with oxygen concentrations greater than 40%.
  - b. Used in nitrox production by the partial pressure mixing method with gas mixtures containing greater than 40% oxygen as the enriching agent.

Air Purity: CGA Grade E (Section 3.60)	
Condensed Hydrocarbons	5mg/m <sup>3</sup>
Hydrocarbon Contaminants	No greater than 0.1 mg/m <sup>3</sup>

- g) Gas Mixing and Analysis for Organizational Members
1. Personnel Requirements
    - a. Individuals responsible for producing and/or analyzing nitrox mixtures should be knowledgeable and experienced in all aspects of the technique.
    - b. Only those individuals approved by the DSO and/or DCB should be responsible for mixing and/or analyzing nitrox mixtures.
  2. Production Methods - It is the responsibility of the DCB to approve the specific nitrox production method used.
  3. Analysis Verification by User
    - a. It is the responsibility of each diver to analyze prior to the dive the oxygen content of his/her scuba cylinder and acknowledge in writing the following information for each cylinder:  $fO_2$ , MOD, cylinder pressure, date of analysis, and user's name.
    - b. Individual dive log reporting forms should report  $fO_2$  of nitrox used, if different than 21%.

### **7.50 Nitrox Diving Equipment**

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

- Labeled SCUBA Cylinders
- Oxygen Analyzers

### **Oxygen Cleaning and Maintenance Requirements**

- a) Requirement for Oxygen Service
1. All equipment, which during the dive or cylinder filling process is exposed to concentrations greater than 40% oxygen at pressures above 150 psi, should be cleaned and maintained for oxygen service.
  2. Equipment used with oxygen or mixtures containing over 40% by volume oxygen shall be designed and maintained for oxygen service. Oxygen systems over 125 psig shall have slow-opening shut-off valves. This should include the following equipment: scuba cylinders, cylinder valves, scuba and other regulators, cylinder pressure gauges, hoses, diver support equipment, compressors, and fill station components and plumbing.

b) Scuba Cylinder Identification Marking

Scuba cylinders to be used with nitrox mixtures should have the following identification documentation affixed to the cylinder.

1. Cylinders should be marked “NITROX”, or “EANx”, or “Enriched Air”.
2. Nitrox identification color-coding should include a 4-inch wide green band around the cylinder, starting immediately below the shoulder curvature. If the cylinder is not yellow, the green band should be bordered above and below by a 1-inch yellow band.
3. The alternate marking of a yellow cylinder by painting the cylinder crown green and printing the word “NITROX” parallel to the length of the cylinder in green print is acceptable.
4. Other markings, which identify the cylinder as containing gas mixes other than Air, may be used as the approval of the DCB.
5. A contents label should be affixed, to include the current  $fO_2$ , date of analysis, and MOD.
6. The cylinder should be labeled to indicate whether the cylinder is prepared for oxygen or nitrox mixtures containing greater than 40% oxygen.

c) Regulators - Regulators to be used with nitrox mixtures containing greater than 40% oxygen should be cleaned and maintained for oxygen service, and marked in an identifying manner.

d) Other Support Equipment

1. An oxygen analyzer is required which is capable of determining the oxygen content in the scuba cylinder. Two analyzers are recommended to reduce the likelihood of errors due to a faulty analyzer. The analyzer should be capable of reading a scale of 0 to 100% oxygen, within 1% accuracy.
2. All diver and support equipment should be suitable for the  $fO_2$  being used.

e) Compressor system

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

f) Fill Station Components - All components of a nitrox fill station that will contact nitrox mixtures containing greater than 40% oxygen should be cleaned and maintained for oxygen service. This includes cylinders, whips, gauges, valves, and connecting lines.

## **SECTION 8.00 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 AAUS. Divers shall comply with all scuba diving procedures in this standard unless specified.

### **8.10 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).

### **8.20 Other diving technologies and activities**

At present, other diving technologies not expressly identified in this manual are prohibited for general use by Florida Tech divers. These technologies include rebreathers, mixed gas other than Nitrox and other diving gear.

Planned decompression dives or dives that penetrate caves or wrecks or under sea ice are also prohibited.

## SECTION 9.0 HEALTH ISSUES

Although health issues are covered in diver training and first aid courses, it is imperative to stress that health and safety are the paramount objectives of all diving activities. This section covers basic health issues and rules imposed by Florida Tech.

### 9.10 Fitness

In programs where personnel dive regularly, the diving itself will keep them physically fit and special attention need only be paid to colds or other physical ailments. Where personnel dive only from time to time, there may be a problem of maintaining adequate physical fitness. Although fitness may apparently be needed to perform planned tasks, an emergency can produce a situation where fitness, quick reflexes and strength may make the difference between safety or a serious accident. In preparation for diving operations, the Lead Diver in charge should consider the fitness of all personnel involved, taking into account the recent diving operations or sporting activities which may have helped to maintain fitness. If personnel are obviously unfit, they should not dive.

### 9.20 Sleep and Fatigue

Adequate rest and sleep will be defined by the requirements of the diving program and the fitness of the diving personnel. During diving, fatigue is dangerous and a tired diver should not be permitted to dive. Sleep and rest periods should be built into the planning of a project to enable well-rested divers to perform the necessary tasks. The nature of data collection or other underwater objectives must be taken into account by the Project Director in developing project plans.

### 9.30 Cold

Cold is one of the major hazards that affect divers.

The combination of fatigue and cold should be avoided at all costs in diving operations. If this is not possible, abandonment or serious revision for the project must be considered by the Project Director. A project plan which ignores diver comfort and safety, especially with regard to cold, will inevitably result in bad morale and less than enthusiastic divers. The Project Director must make divers aware of the potential problems with cold and of all possible ways that the cold can be mitigated.

9.3.1. A cold diver is liable to fatigue rapidly and to make errors of judgment. They will be less able to cope with diving tasks or emergencies and will be less able to concentrate. Cold will affect divers differently – some divers are more susceptible than others. There are many conditions that will play a role in cold effects. The major ones are:

1. The duration and depth of the dive.
2. The age and physical state of the diver.
3. The equipment used.
4. The work to be accomplished.
5. Water conditions such as temperature, current and salinity.
6. Weather conditions.
7. Male vs. female divers.
8. The dive profile including surface intervals.

9.3.2. While it is important to concentrate on the immersion factor, it is also crucial to recognize that major cold stresses on the diver also include pre and post dive conditions when the diver is possibly exposed to air, wind and spray, all of which are significant chilling agents.

9.3.3. Divers continue to lose heat from their bodies for some time after they get out of the water. This “after-drop” in central body temperature can reach dangerous limits even if at the time of getting out of the water the diver was in a reasonable state. The problems of cold exposure can occur in all waters, tropical as well as polar.

9.3.4. The physiological responses to cold are divided into two categories – Subtle Hypothermia and Gross Hypothermia.

1. Subtle Hypothermia

A divers subjective evaluation of their thermal balance may vary greatly and if heat loss takes place slowly over a prolonged period of time, the diver is more likely to misjudge their thermal state than a diver who cools rapidly. Divers often tend to suppress the feeling of cold, clench their teeth, and accept the discomfort. This typically results in subtle hypothermia. It is, however, important to recognize heat loss as a problem that is potentially dangerous and renders the quality of the work performed as questionable. Feeling cold is by no means merely a nuisance.

A loss in core temperature of as little as 0.5 to 0.8° C may result in a loss in mental capacity of 10 – 20% and as much as 40% in memory. Muscle strength and dexterity may deteriorate to similar extent. Loss of strength is a direct safety hazard while memory loss and mental slowness entails that the scientific value of the diver’s performance may be seriously degraded.

A slowly cooling diver may gradually go into a state of stupor while feeling reasonably normal. In addition to the effects of cold is the added effect of nitrogen narcosis. If a hypothermic diver is exposed to pressure with which they otherwise is able to cope, nitrogen narcosis may significantly add to the cold effect and cause an unanticipated reduction in mental and muscular performance. While a thermally comfortable diver tends to respond to nitrogen narcosis with a relaxed attitude, a hypothermic person will often react with anxiety and claustrophobia and may, depending on self control and training, respond with panic.

2. Gross Hypothermia

A case of gross hypothermia means a cooling that poses a direct hazard to a person’s life by influencing heart rhythm and breathing. If the core temperature drops below about 35° C, cardiac performance becomes erratic. At about 23° C, most persons will become unconscious and will eventually die from cardiac arrest and paralysis of the breathing muscles.

9.3.5. Hypothermia prevention and treatment

In practice, gross hypothermia is rarely encountered in diving. Subtle hypothermia is, however, an inherent problem in both warm and cold water diving. The following precautions can be taken to help minimize the problems of cold exposure.

1. Use sufficient thermal protection to avoid hypothermia or reduce it to a minimum. A dry suit with suitable undergarments and air inflation are more effective than a neoprene wet suit for diving in temperate or sub-polar waters. Suit heating systems are available but all have operational limits.

2. Divers should keep warm before the dive. Shore and boat parties should be kept sufficiently warm to perform their duties.
3. Limit dive times to reduce heat loss. Plan dives to avoid frequent immersion and draining of wet suits in cold water if possible.
4. Keep in a warm environment out of the wind. If wearing a wet suit, wear a wind proof cover over the wet suit at least on the trunk of the body.
5. Allow sufficient time between dives to warm up.
6. Provide hot drinks and a high daily caloric intake during cold water diving. Alcoholic drinks must not be used to warm a cold diver.

#### **9.4. Food and Drink**

In most circumstances, normal daily food and fluid intake is left to individual discretion. At the beginning of a diving day, however, it is a good idea to eat a carbohydrate and fat rich breakfast for a long term energy supply. For lunch and snacks, consumption of high energy foods which are sugar or calorie rich provide energy to get through the rest of the working day. High protein foods will be best used by the body in terms of overall food type during the course of a working diving project. Where diving is to be conducted in more remote areas, the Project Director must ensure that a balanced diet and adequate fluid intake be provided to all divers. Medical and dietary advice should be sought before leaving for such areas.

#### **9.5. Alcohol and Drugs**

Alcohol may increase the susceptibility to decompression sickness. Alcohol may also enhance heat loss in cold water exposure, increasing the severity of hypothermic effects. Drugs fall into two categories - those administered for medical reasons and those that are addictive or mood altering.

##### **9.5.1. Regulations for Alcohol Consumption**

1. Alcoholic drinks will not be consumed during the course of diving operations.
2. No alcoholic drinks will be consumed within 12 hours prior to a dive.
3. A two drink maximum is allowed per day (24 hour period) as long as there is 12 hour period prior to a dive when there is no consumption of alcohol. A drink is defined as 1 beer, 1 glass of wine or 1 shot of hard liquor.
4. However, it is strongly recommended not to drink alcohol within 24 hours prior to a dive.
5. Alcohol and SCUBA diving both cause dehydration. Remember to drink plenty of non-alcoholic fluids prior to a dive.
6. Although you may follow the 2 drink maximum rule, the Dive Supervisor is still empowered to refuse to let you dive.

##### **9.5.2. Mood Altering or Addictive Drugs**

Under no circumstances should personnel who use addictive or mood altering drugs, or who have done so in the recent past, be allowed to take part in any facet of a diving operation. Any potential member of a diving team who has had a drug abuse history, must be cleared by a doctor competent to consider the physiological and psychological effects of prior drug use on diving capabilities. It is mandatory that the Lead Diver insure that no drug affected personnel are involved in any operations and that no drugs are abused during the course of a diving operation.

##### **9.5.3. Prescribed Medication**

In general, medical use of drugs during diving should be avoided where possible. At present, there is considerable concern that the effects of many drugs in common use may change in

hyperbaric conditions. Drugs can influence diving safety in indirect ways by impairing judgment and concentration or by increasing a diver's susceptibility to narcosis and decompression sickness. Individuals under medical treatment are in general, unlikely to be diving. The DSO/Project Director/Lead Diver should be aware that individuals may be using drugs to control common problems such as sea-sickness, headaches, etc.. This common practice of self-medication may present a hazard and the DSO/Project Director/Lead Diver may wish to restrict their use or restrict the diver's activities. The DSO/Project Director/Lead Diver must seek medical advice in any case of doubt.

## **9.6. Contaminated Air**

1. If there is any suspicion that the air used while diving is contaminated, then the dive must be aborted immediately and the air checked by a reputable, qualified individual or agency.
2. Compressed air shall only be obtained from sources known to conform to approved national standards.
3. If compressors are used in the field, frequent attention must be paid to placing of the air intake in relation to fumes and smoke, not only from the compressor but also from vehicles, boats and houses in the vicinity. The intake is best fitted with a suitable length of flexible pipe to allow for changes of wind direction. Adequate cooling is essential to prevent contamination of air by overheating of lubricating oils.
4. In a permanent laboratory site, times of compressing may need to be restricted according to wind direction in relation to sources of air pollution.
5. Precise adherence to manufacturer's recommendations in relation to filter replacement, maximum continuous running time and cooling is essential.

## **9.7. Narcosis and Decision Making**

Inert gas narcosis impairs many aspects of diver performance both in intellectual and manual skills. These narcotic effects, which have been likened to drunkenness, are normally felt at depths greater than 90 feet and increase progressively with depth. Stress and anxiety greatly exaggerate the effects of narcosis and can impair performance. Frequent (daily) repeated dives tend to reduce these effects and increase the work capacity of divers. If there is suspicion that a diver has nitrogen narcosis, the diver must ascend to a shallower depth to alleviate the symptoms.

## **9.8. Decompression Sickness**

### **9.8.1. Decompression Sickness Facts**

1. The risk of decompression sickness and arterial gas embolism increases close to the surface.
2. Repetitive dive tables control the development of symptoms and not necessarily the release of gas.
3. No method is available to predict which diver will develop symptoms.
4. It may not be possible to determine, in the presence of serious symptoms, whether the diver has an arterial gas embolism (AGE) or decompression sickness. When rendering first aid to injured divers, do not attempt to distinguish between the two. First Aid treatment for either should be the same.

### **9.8.2. Simple Decompression Sickness: Type 1**

1. Pain at the site of a joint and skin rash. The pain is localized at the site and the diver is usually able to point to the specific area. Pain in the other sites is much more likely to be referred pain from serious problems in the nervous system.

2. Skin rashes are due to the blockage of capillaries and lymph canals by bubbles and the release of substances that cause the redness and itch to develop. The rashes may be accompanied by nervous system decompression sickness.

#### 9.8.3. Serious Decompression Sickness: Type 2

1. Acute respiratory distress, the “chokes”, is due to the entrapment of bubbles in the lung and correlates with the bubble count in the pulmonary artery. Severe forms are usually associated with a gross omission of decompression and may lead to sudden death. Milder forms often subside without treatment but this is no reason not to institute therapy. Very often respiratory symptoms are followed by the development of neurological decompression sickness.
2. Neurological decompression sickness can involve any nerve function. Because of the need for immediate treatment, it is essential that symptoms involving the nervous system are recognized. The symptoms can include loss of consciousness, headache, dizziness, vertigo, loss of hearing, disturbances in vision, weakness, paralysis and loss of sensation.

#### 9.8.4. Decompression Illness Treatment

1. The treatment of decompression illness is aimed at reducing or eliminating the amount of gas that has separated from solution and correcting secondary effects like tissue edema, hypoxia and shock. It must be emphasized that serious decompression sickness is an extreme emergency and evaluation by a medical doctor and ensuing recompression treatment should be undertaken as soon as possible.

#### 9.8.5. Flying or Driving to Altitude After Diving

1. Assuming there are no symptoms of decompression sickness, follow the DAN recommendations listed below when flying or driving to an altitude between 1000 – 8000 feet (300 – 2400 meters). Cabin pressure of most commercial airliners is equivalent to an altitude of about 8000 feet.
2. For 1 – 2 days of no-decompression diving: if total accumulated bottom time for all dives is less than 2 hours, wait at least 12 hours before going to altitude. If bottom time exceeds 2 hours, wait 24 hours.
3. For more than 2 days of diving, or after any dive requiring emergency decompression, wait at least 24 hours.

#### 9.8.6. Emergency Decompression

1. Since all dives made under the auspices of Florida Tech are planned as no-decompression dives, no diver should have to make any type of planned decompression.
2. In the event that emergency decompression is required, follow the decompression procedures established by the PADI dive tables.

## SECTION 10. EMERGENCY SITUATION TRAINING

It is required that all members of the diving team at any project site be currently certified in CPR/AED, First Aid, Oxygen Administration, On-Site Neurological Exam and other aspects of emergency training, as listed in Section 5.30.

### 10.1. First Aid Kit

All diving operations must have a first aid kit located on the dive platform. The requirements of such a kit will differ with different diving operations. The Florida Tech

DSO has a First Aid Kit that can be borrowed for dives in the Florida region. Medical and first aid needs should be considered in advance, especially when working in remote locations or unfamiliar environments.

## 10.2. Emergency Oxygen Kits

All diving operations must have a Emergency Oxygen kit located on the dive platform. The Florida Tech DSO has an Emergency Oxygen Kit that can be borrowed for dives in the local Florida region. Diving projects conducted away from the Melbourne area, or for an extended period of time, may need to purchase/rent their own kit.

## SECTION 11. EMERGENCY SITUATION PROCEDURES

- 11.1** A diver must not try to rescue another diver if, in their own judgment, that aiding another diver may put the rescuer or other members of the dive team in danger.
- 11.2** Diving equipment, which has been put on board a research vessel for use in emergencies, is under direct control of the Captain. If the equipment has to be used, a report must be submitted to the Diving Safety Officer, written jointly by the Captain, Project Director, Lead Diver or appropriate combination involved in the operation.
- 11.3** During an emergency situation, the dive buddy should assist the injured diver to the surface and to the boat where afterward they should proceed as instructed by the Lead Diver. Follow-up actions could include:
1. Assistance to the injured person, e.g. CPR, AED use, emergency Oxygen administration, first aid, shock management, etc..
  2. Contact DAN (Diver's Alert Network at 919-685-8111), Coast Guard, helicopter assistance, home base, passing vessel, hospital or nearest recompression chamber as appropriate using radio or cell phone if possible.
  3. Ensure that other members of the diving team are not at risk and that, in the haste of the emergency, no equipment has been left behind.
  4. Proceed as fast as possible to the nearest port or hospital as dictated by the circumstances and the victim's condition.
  5. **Under no circumstances are divers to proceed directly to a recompression chamber. You must go to a hospital first to get a diagnosis before treatment in a recompression chamber.**
  6. Note down immediately the details of the victim's dive during which they were injured. It may be vital for medical personnel to determine how long the victim was in the water or how much decompression the victim should have had.
  7. If recompression is required, try to ensure that all recent dive record sheets or log books are available for the doctors as this may assist treatment. The details of the diver's last medical examination may also be useful if it can be obtained quickly.
  8. When the immediate emergency is passed and all necessary steps have been taken to assist the victim, a full record of the incident must be compiled and a full copy of the report must be provided to the DSO/DCB as soon as possible. When practical, gather as much information as possible at the time of the emergency. Start making notes, obtaining details from other divers, noting exact times, etc..
  9. Remember that the buddy of a diver who develops symptoms of decompression sickness, even on a dive apparently carried out according to the no decompression tables, may also develop symptoms later and require recompression.

10. If the accident is fatal or seems likely to result in a fatality, the DSO/DCB should be notified as soon as possible. The DSO/DCB/proper campus official will notify the next of kin.

#### **11.4 General Instructions for Dealing with Diving Accidents**

1. Keep calm, make appropriate contact with victim or rescue as required. Reassure the injured diver. Have someone contact EMS as soon as possible.
2. Be sure that the scene is SAFE for you and any others assisting. Blood borne and other pathogens and transmission of disease and infection are always a concern. Use masks, goggles and gloves whenever possible to minimize the risk of infection.
3. Make sure the victim's Airway is clear, and **Breathing & Circulation** are maintained (ABCs).
4. If available utilize an AED. Time is critical for injured divers with a heart condition and early AED use greatly increases their chances of survival.
5. Administer 100% oxygen and keep the injured diver lying on his/her back with head declined, feet up and the left side of the body in the down position. Do not stop providing oxygen to an injured diver even if the he/she is breathing normally and/or seems otherwise fine, unless there is a need to reopen the airway or the diver shows signs of oxygen convulsions.
6. Keep the injured diver out of the hot sun, watch for shock and protect him/her from environmental factors.
7. Do not give the injured diver any type of medication. If evidence of shock seems apparent, do not give the injured diver any food or drink.
8. A complete history of all events leading up to the accident and evacuation must be forwarded with the injured diver. If the injured diver is conscious and stable, a secondary exam should be conducted to determine **S**igns/symptoms, **A**llergies, **M**edications, **P**ast history, **L**ast meal and **E**vents leading up to the accident (SAMPLE). An onsite neurological assessment should also be conducted, when possible.
9. Ensure the paramedics or physician understands about the effects of gas and cardiovascular interaction if they have not dealt with decompression sickness.
10. A well-trained diver may be the most knowledgeable person on the scene regarding diving accidents and must, therefore, make a continuing effort to insure that proper treatment is given.
11. Depth gauges, tanks, regulators and other diving equipment should be forwarded with the patient and should be properly tagged or at least set aside **without tampering**, especially if the accident was fatal.

#### **11.5. Radio Contact Procedures**

1. Radio contact procedures vary in practice but some general principles apply.
2. Know at what times emergency channels are being monitored and the frequencies of these channels. If possible, know where monitoring stations are and what the range of your radio equipment is.
3. Stay on the air broadcasting for the shortest possible time. This conserves your batteries (broadcasting uses more energy than receiving) and gives others more time to talk to you. Also, other people may need to use the frequency for a message of even greater emergency.
4. Use a call sign. Identify yourself first at the beginning of each transmission. Include position in this statement in even a general context.

5. Do not panic and signify a greater urgency over the radio than the situation requires. There are three international call signs you can use that will immediately allow those coming to your aid to implement an appropriate response:
  1. **PAN – PAN – PAN.** Stay on this frequency. I will have a message that concerns safety but there is no immediate urgency.
  2. **SECURITE – SECURITE – SECURITE.** Stay on this frequency and keep the channel clear. I have a message that involves safety and there is some urgency.
  3. **MAYDAY – MAYDAY – MAYDAY.** This is an all-purpose distress call for immediate aid. Persons and craft or vessels are in immediate danger. Emergency is of a life threatening nature. With lights or other signaling, **SOS – SOS – SOS** conveys the same message.
  4. The international language for air traffic control and for pilots is English. Most such radio traffic is conducted in English.

### **11.6 Evacuation by Helicopter or Aircraft**

1. Request a helicopter with a medic crew and oxygen.
2. Try to establish radio communications with the helicopter.
3. Mark the position of the victim by use of some signal, i.e. smoke flares, as there may be other boats and divers in the vicinity.
4. If pick-up is from a boat, maintain a speed of 10 – 15 knots with the wind about 20 degrees on the port bow. Put all antennas down, if possible, without losing communications. Secure all loose objects on deck because of the strong downdraft from the helicopter.
5. Make sure the injured diver is ready in advance of the transfer and is wearing a life jacket.
6. **Always let the lifting device or cable lowered by the helicopter to touch the boat before handling it.** This is necessary to prevent electric shock.
7. Do not secure the lifting line to the boat.
8. Secure the injured diver in lifting basket face up.
9. Attach personal information such as name, address, age and what happened.
10. Signal the helicopter pilot when all is ready using hand signals by day and flashlights at night.
11. Ensure that the flight crew knows that it is important to fly close to the ground or to pressurize the aircraft to 720 ft (220m) to prevent intensification of decompression sickness. Oxygen administration should continue.
12. Provided the aircraft can handle the extra weight, the diving buddy should also be transported because they may also require recompression and can provide information and comfort to the injured diver if needed.

### **11.7. Reporting Procedures**

Accidents must be reported according to the procedures described in Section 2.7.

## **SECTION 12. Hazardous Marine Life**

### **12.1. General Rules to Avoid Injury from Hazardous Marine Life**

1. Avoid diving in low visibility water.
2. Take advice from local divers and fishermen.
3. Study the available information about the behavior of the species anticipated.
4. Do not feed large fish. They may learn to associate divers with food and can become aggressive if not fed.

5. Do not use aggressive methods to control large animals except as a last resort. If large animals, particularly mammals, learn that divers are aggressive, this can result in unprovoked attacks.
6. Do not encourage play activities which can also result in unprovoked attacks.
7. Do not stand or touch corals or other benthic organisms.
7. Obey local game laws and regulations.
8. Maintain proper buoyancy at all times.

## **12.2. Sharks**

1. Although attacks by sharks on divers do occur, most sharks do not present a hazard. However, all sharks should be treated with respect. Sharks often concentrate where deep waters abut shallow habitats such as over sea mounts and edges of coral reefs. Since diving activities often occur in these habitats, chances of encountering sharks are high.
2. Guidelines to reduce shark attack:
  1. Fishing in the vicinity of a diving operation should be banned at least for crew members of the research vessel and for nearby boats if possible.
  2. If fish must be collected by divers, they should be attached to a float and kept away from divers.
  3. Scraps or rubbish must not be dumped by the research vessel before or during a dive operation.
  4. An injured or bleeding diver must leave the water immediately. Other divers should also leave the water for a while if blood is in the water.
  5. Be aware of behavioral displays that indicate a shark is defending a territory. Such displays include adopting an S posture often with the pectoral fins being brought together below the shark's body.
  6. If a shark demonstrates territorial displays or show more than a passing interest in a diver, the dive should be aborted. Divers should return to the boat in as calm a manner as possible.

## **12.3. Stinging Marine Animals**

1. Most animals that inflict injury by stings are Cnidaria which include hydroids, fire coral, Portuguese Man of War, jellyfish, sea wasps, some common corals and anemones. Stings are administered through many stinging cells on the tentacles. Symptoms range from mild discomfort to a stinging sensation and a throbbing pain that may render the victim unconscious. Death can result in severe cases from respiratory and cardiac arrest.
2. The diver must be careful in their approach to rocks, coral surfaces and grasses. Remember that the stinging cells can be brushed off onto the wetsuit, equipment or samples and are capable of stinging long after the encounter with the host animal. In the case of free-swimming jellyfish, divers should keep their attention focused up current for drifting animals. During an ascent, when stinging jellyfish are likely to be encountered, at least one of the divers should turn in the water while looking upward and watching for dangling tentacles. Care should also be taken to examine lines and other objects for tentacles left by passing jellyfish.
3. Not all jellyfish sting. However, it is important that if a diver becomes enmeshed in tentacles, the diver should remove the tentacles with calm, deliberate actions rather than in a panic that can exacerbate contact and stinging. For most Jellyfish or other hazardous marine life stings, treatment involves: flushing the affected area with lots of seawater; careful removal of remaining tentacles using tweezers, forceps or a gloved hand; shaving

the area with a razor; application of very hot water to neutralize pain and to assist in breaking down proteins from fired nematocysts; application of a topical ointment such as hydrocortisone followed with a light bandage covering. For box jellyfish, blue-ringed octopus, cone snails and sea snake envenomations, vinegar should be used in place of hot water, a compression bandage should be applied to both sides of the affected area to slow the spread of venom and access to EMS care should be sought immediately. It is critical to maintain CPR for victims of these marine creatures as respiratory distress can occur within minutes of envenomation.

#### **12.4. Venomous Puncture Wounds**

1. These wounds may be inflicted by sting rays, catfish, stonefish, scorpionfish, lion fish, sea urchins and other types of venomous marine life. Divers must avoid the venomous spines of these animals. The pain from venomous fish stings is usually immediate, intense and can be characterized by sharp shooting pains or throbbing. Pain radiates from the affected area. Extreme cases involve unconsciousness and possible cardiac arrest.
2. Divers must be very careful in observing the bottom and avoiding these cryptic animals that usually bury in sand or hide on rocky bottoms. These fishes will not usually attack divers unless approached very closely or inadvertently touched. Slow progress and use of a stick to prod sand and suspicious areas can often expose these animals. When descending, it is good practice to use the tip of the fin to make initial contact with the bottom and then gently probe the surrounding substrate.

#### **12.5. Non-Venomous Bites**

The Moray and Conger Eels, Barracuda and shark can inflict tearing, jagged lacerations. The shark bite is generally most serious and often requires dramatic first aid to save the victim's life. Relatively minor bites, such as those of eel and Barracuda require first aid procedures for lacerations. Eels are generally found in enclosed spaces and holes. Probing these areas is recommended before exploring with a hand or more of the body. Free swimming fish attacks are difficult to predict. Exiting from the water is recommended if there are no forms of protection or fish are behaving aggressively.

#### **12.6. Diving Near Very Large Animals**

1. Very large animals such as whales, large fish, turtles and seals are rarely seen by divers. Diving with them, either by choice or by accident, is often a once-in-a-lifetime experience for the majority of divers. Very large animals are potentially dangerous because even if they are not actively aggressive, their sheer bulk, power and agility can result in accidental injuries. Even the most docile animals should be treated with caution to ensure that injuries do not occur.
2. Learn as much as possible about the behavior of the species concerned and plan the dives and support accordingly. Be aware that behavior can change seasonally. Many species are more aggressive during their breeding season.
3. Very large animals have few natural predators and will generally have little or no apprehension of divers. They may even approach divers from curiosity. Even normally docile species can become aggressive when cornered, if their young are approached, or if you infringe on their breeding or feeding territories. Chance encounters with very large animals requires that divers be trained to react appropriately for the circumstances. Lead Divers should appreciate that such events have strong psychological effects and that previously reliable divers can react in an unpredictable manner. If an accidental meeting occurs, it is often safest to leave the water calmly and quickly.

# **Appendices**

**Appendix 1 through 9  
Required For All Organizational Members**

**Appendix 10.1 through 10.7  
Required for all Florida Tech Projects and Divers**

**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 Florida Tech Dive Program. 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 Florida Tech Dive Program standards. Thank you for your assistance.

Diving Safety Officer	Date
Tim Fletcher	321-727-7930
Printed Name	Phone Number

Scuba and other modes of compressed-gas diving can be strenuous and hazardous. A special risk is present if the middle ear, sinuses, or lung segments do not readily equalize air pressure changes. The most common cause of distress is eustachian insufficiency. Most fatalities involve deficiencies in prudence, 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 disease<sup>3</sup>. [33 - 35]

<sup>3</sup> “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>

16. Atrial septal defects. [39]
17. Significant valvular heart disease - isolated mitral valve prolapse is not disqualifying. [38]
18. Significant cardiac rhythm or conduction abnormalities. [36 - 37]
19. Implanted cardiac pacemakers and cardiac defibrillators (ICD). [39, 40]
20. Inadequate exercise tolerance. [34]
21. Severe hypertension. [35]
22. History of spontaneous or traumatic pneumothorax. [45]
23. Asthma<sup>4</sup>. [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]

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### 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://circ.ahajournals.org/cgi/content/full/96/1/345>

- 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://circ.ahajournals.org/cgi/reprint/circulationaha;100/13/1481>

- 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.

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<sup>4</sup> “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 (Mo/Day/Year)

To The PHYSICIAN:

This person is an applicant for training or is presently certified to engage in diving with self-contained underwater breathing apparatus (scuba). This is an activity that puts unusual stress on the individual in several ways. Your opinion on the applicant's medical fitness is requested. Scuba diving requires heavy exertion. The diver must be free of cardiovascular and respiratory disease. An absolute requirement is the ability of the lungs, middle ear and sinuses to equalize pressure. Any condition that risks the loss of consciousness should disqualify the applicant.

**TESTS:** Please initial that the following tests were completed.

**[ ] Initial Examination**

- \_\_\_\_\_ Medical History
- \_\_\_\_\_ Complete Physical Exam with emphasis on neurological and otological components
- \_\_\_\_\_ Chest X-Ray
- \_\_\_\_\_ Spirometry
- \_\_\_\_\_ Hematocrit or Hemoglobin
  
- \_\_\_\_\_ Urinalysis
- \_\_\_\_\_ Any further tests deemed necessary by the physician

**Additional testing for first over age 40**

- \_\_\_\_\_ Resting EKG
- \_\_\_\_\_ Assessment of coronary artery disease using Multiple-Risk-Factor Assessment<sup>5</sup>  
(age, lipid profile, blood pressure, diabetic screening, smoker) Note: Exercise stress testing may be indicated based on risk factor assessment<sup>6</sup>

**[ ] Re-examination**

**(Every 5 years under age 40,  
first exam over age 40,  
every 3 years over age 40,  
every 2 years over age 60)**

- \_\_\_\_\_ Medical History
- \_\_\_\_\_ Complete Physical Exam, with emphasis on neurological and otological components
- \_\_\_\_\_ Hematocrit or Hemoglobin
- \_\_\_\_\_ Urinalysis
- \_\_\_\_\_ Any further tests deemed necessary by the physician

**Additional testing for over age 40**

- \_\_\_\_\_ Resting EKG
- \_\_\_\_\_ Assessment of coronary artery disease using Multiple-Risk-Factor Assessment<sup>5</sup>  
(age, lipid profile, blood pressure, diabetic screening, smoker) Note: Exercise stress testing may be indicated based on risk factor assessment<sup>6</sup>

**RECOMMENDATION:**

- [ ] APPROVAL. I find no medical condition(s) that I consider incompatible with diving.
- [ ] RESTRICTED ACTIVITY APPROVAL. The applicant may dive in certain circumstances as described in REMARKS.
- [ ] FURTHER TESTING REQUIRED. I have encountered a potential contraindication to diving. Additional medical tests must be performed before a final assessment can be made. See REMARKS.
- [ ] REJECT. This applicant has medical condition(s), which, in my opinion, clearly would constitute unacceptable hazards to health and safety in diving

<sup>5</sup> "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>

<sup>6</sup> Gibbons RJ, et al. 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). Journal of the American College of Cardiology. 30:260-311, 1997. <http://www.acc.org/clinical/guidelines/exercise/exercise.pdf>

**REMARKS:**

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**PHYSICIAN'S STATEMENT:**

I have evaluated the above-mentioned individual according to the American Academy of Underwater Sciences medical standards for scientific diving (Section 6.00), and find no conditions that may be disqualifying. 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.

\_\_\_\_\_ MD or DO  
Date    Signature

\_\_\_\_\_  
Name (Print or Type)

\_\_\_\_\_  
Address

\_\_\_\_\_  
Telephone Number

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

My familiarity with diving medicine is:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**APPLICANT'S RELEASE OF MEDICAL INFORMATION FORM**

I authorize the release of this information and all medical information subsequently acquired in association with my diving to the Florida Tech Diving Safety Officer and Diving Control Board or their designee at (place) \_\_\_\_\_ on (date) \_\_\_\_\_.

Signature of Applicant \_\_\_\_\_

**APPENDIX 3  
DIVING MEDICAL HISTORY FORM**

(To Be Completed By Applicant-Diver)

Name \_\_\_\_\_ Sex \_\_\_\_ Age \_\_\_\_ Wt. \_\_\_\_ Ht. \_\_\_\_

Sponsor \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_  
(Dept./Project/Program/School, etc.) (Mo/Day/Yr)

**TO THE APPLICANT:**

Scuba diving makes considerable demands on you, both physically and mentally. Diving with certain medical conditions may be asking for trouble not only for yourself, but also to anyone coming to your aid if you get into difficulty in the water. Therefore, it is prudent to meet certain medical and physical requirements before beginning a diving or training program.

Your answers to the questions are as important, in determining your fitness as your physical examination. Obviously, you should give accurate information or the medical screening procedure becomes useless.

This form shall be kept confidential. If you believe any question amounts to invasion of your privacy, you may elect to omit an answer, provided that you shall subsequently discuss that matter with your own physician and they 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. Please respect the advice and the intent of this medical history form.

	<b>Have you ever had or do you presently have any of the following?</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
1.	Trouble with your ears, including ruptured eardrum, difficulty clearing your ears, or surgery.			
2.	Trouble with dizziness.			
3.	Eye surgery.			
4.	Depression, anxiety, claustrophobia, etc.			
5.	Substance abuse, including alcohol.			
6.	Loss of consciousness.			
7.	Epilepsy or other seizures, convulsions, or fits.			
8.	Stroke or a fixed neurological deficit.			
9.	Recurring neurologic disorders, including transient ischemic attacks.			
10.	Aneurysms or bleeding in the brain.			
11.	Decompression sickness or embolism.			
12.	Head injury.			
13.	Disorders of the blood, or easy bleeding.			
14.	Heart disease, diabetes, high cholesterol.			
15.	Anatomical heart abnormalities including patent foramen ovale, valve problems, etc.			
16.	Heart rhythm problems.			
17.	Need for a pacemaker.			
18.	Difficulty with exercise.			

19.	High blood pressure.			
20.	Collapsed lung.			
21.	Asthma.			
22.	Other lung disease.			
23.	Diabetes mellitus.			
24.	Pregnancy.			
25.	Surgery If yes explain below.			
26.	Hospitalizations. If yes explain below.			
27.	Do you take any medications? If yes list below.			
28.	Do you have any allergies to medications, foods, and environmental? If yes explain below.			
29.	Do you smoke?			
30.	Do you drink alcoholic beverages?			
31.	Is there a family history of high cholesterol?			
32.	Is there a family history of heart disease or stroke?			
33.	Is there a family history of diabetes?			
34.	Is there a family history of asthma?			

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

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

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Signature

Date

**APPENDIX 4**  
**RECOMMENDED PHYSICIANS WITH EXPERTISE IN DIVING MEDICINE**

List of Medical Doctors and treatment facilities in the local area (Brevard/Indian River counties) that have training and expertise in diving or undersea medicine:

1. Dr. Michael Ott – Board Certified in Hyperbaric and Diving Accident Treatment  
Melbourne Internal Medicine Associates (MIMA)  
200 E. Sheridan Road  
Melbourne, FL 32901  
  
Phone: 321-725-4500  
Email: michael.ott@mima.com
  
2. Florida Hospital – Hyperbaric Medicine and Wound Care  
(nearest recompression chamber to Melbourne/Brevard County Area)  
601 East Rollins St.  
Orlando, FL 32803  
  
Phone: 407-303-1549  
800-824-0085 (after hours emergencies)
  
3. Holmes Regional Medical Center  
1350 South Hickory Street  
Melbourne, FL 32901  
  
Phone: 321-434-7000
  
4. Sebastian River Medical Center  
13695 U.S. Highway 1  
Sebastian, FL 32958  
  
Phone: 772-589-3186
  
5. Indian River Memorial Hospital  
1000 36<sup>th</sup> Street  
Vero Beach, FL 32960  
  
Phone: 772-567-4311
  
6. Divers Alert Network (DAN) – Duke University Medical Center  
(24 hour hotline for diving injuries)  
1-919-684-4326

## **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.

Revised 1/18/11

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

$fN_2$  - Fraction of nitrogen in a gas mixture, expressed as either a decimal or percentage, by volume.

$fO_2$  - 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 - While similar to Surface Supplied in that the breathing gas is supplied from the surface by means of a pressurized hose, the supply hose does not require a strength member, pneumofathometer hose, or communication line. Hookah equipment may be as simple as a long hose attached to a standard scuba cylinder supplying a standard scuba second stage. The diver is responsible for the monitoring his/her own depth, time, and diving profile.

Hyperbaric Chamber - See 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  $pO_2$  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.

pN<sub>2</sub> - Inspired partial pressure of nitrogen, usually expressed in units of atmospheres absolute.

pO<sub>2</sub> - 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 - Surface Supplied: Dives where the breathing gas is supplied from the surface by means of a pressurized umbilical hose. The umbilical generally consists of a gas supply hose, strength member, pneumofathometer hose, and communication line. The umbilical supplies a helmet or full-face mask. The diver may rely on the tender at the surface to keep up with the divers’ depth, time and diving profile.

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

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.

Revised 1/18/11

APPENDIX 6

FLORIDA TECH/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 Florida Tech Diving Safety Manual, and has demonstrated competency in the indicated areas. Florida Tech 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. \_\_\_\_\_
\_\_\_\_\_ AED training (Agency) \_\_\_\_\_ AED Exp. \_\_\_\_\_
\_\_\_\_\_ Oxygen administration (Agency) \_\_\_\_\_ O2 Exp. \_\_\_\_\_
\_\_\_\_\_ First aid for diving (Agency) \_\_\_\_\_ F.A. Exp. \_\_\_\_\_
\_\_\_\_\_ Field/On-Site Neuro Exam (Agecny) \_\_\_\_\_ Neuro 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 could be any person who has been breathing air underwater regardless of depth. It is essential that emergency procedures are pre-planned and that medical treatment is initiated as soon as possible. Florida Tech emergency procedures are summarized below as well as in sections 10 and 11 of this manual. This appendix and any necessary supporting documents must be present and immediately available at each dive location.

### General Procedures

Depending on and according to the nature of the diving accident:

1. Make appropriate contact with victim or rescue as required. Be sure that the scene is SAFE for you and any others assisting. Blood borne pathogens and other contaminants are a concern. Use masks, goggles and gloves whenever possible to minimize the risk of infection.
2. Establish (A)irway, (B)reathing, (C)irculation as required. If available, utilize an AED.
3. Stabilize the victim
3. Administer 100% oxygen, if appropriate (in cases of Decompression Illness, or Near Drowning).
4. Call local Emergency Medical System (EMS) for transport to nearest medical treatment facility. Explain the circumstances of the dive incident to the evacuation teams, medics and physicians. Do not assume that they understand why 100% oxygen may be required for the diving accident victim or that recompression treatment may be necessary.
5. Call appropriate Diving Accident Coordinator for contact with diving physician and decompression chamber. etc.
6. Notify DSO or designee according to the Florida Tech Emergency Action Plan
7. Complete and submit Incident Report Form ([www.aaus.org](http://www.aaus.org)) to the Florida Tech DSO/Dive Control Board and the AAUS (Section 2.70 Required Incident Reporting).

### List of Emergency Contact Numbers Appropriate For Dive Location

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### Available Procedures

- Emergency care
- Recompression
- Evacuation

### Emergency Plan Content

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

## **APPENDIX 8**

### **DIVE COMPUTER GUIDELINES**

1. Only those makes and models of dive computers specifically approved by the Diving Control Board may be used.
2. Any diver desiring the approval to use a dive computer as a means of determining decompression status must apply to the Diving Control Board, complete an appropriate practical training session and pass a written examination.
3. Each diver relying on a dive computer to plan dives and indicate or determine decompression status must have his/her own unit.
4. On any given dive, both divers in the buddy pair must follow the most conservative dive computer.
5. If the dive computer fails at any time during the dive, the dive must be terminated and appropriate surfacing procedures should be initiated immediately.
6. A diver should not dive for 18 hours before activating a dive computer to use it to control their diving.
7. Once the dive computer is in use, it must not be switched off until it indicates complete out gassing has occurred or 18 hours have elapsed, whichever comes-first.
8. When using a dive computer, non emergency ascents are to be at a rate specified for the make and model of dive computer being used.
10. Whenever practical, divers using a dive computer should make a stop between 10 and 30 feet for 5 minutes, especially for dives below 60 fsw.
11. Multiple deep dives require special consideration.

## APPENDIX 9

### FLORIDA TECH/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 the Florida Tech scientific diving organization. Dives logged by divers from another AAUS Organization will be reported with the diver's home organization. Only a diver who has actually logged a dive during the reporting period is counted under this category.

Incident(s) 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 are considered as 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 are considered as 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 are considered as 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 Florida Institute of Technology Forms**

- 10.1 Project Approval Form**
- 10.2 Dive Card Approval Check List**
- 10.3 Application for Dive Card Approval**
- 10.4 Emergency Information Card**
- 10.5 Pre-Dive Checklist**
- 10.6 Dive Log**
- 10.7 End of Project Report**

# Appendix 10.1

## Florida Tech Project Approval Form

(must be submitted to the Florida Tech DSO at least 2 weeks prior to planned dive activities)

Diving Safety Officer Use Only

Project # \_\_\_\_\_

Approval Date: \_\_\_\_\_

1. Objective of Project (use separate sheet if necessary)
2. Project Director: \_\_\_\_\_
3. Lead Diver: \_\_\_\_\_
4. Florida Tech and other project equipment to be used (boats, dive gear, transportation, etc.)
5. Special Diving Equipment:

6. Dive Sites (use additional sheets if necessary)

	1	2
Location	_____	_____
Depth	_____	_____
Day/Night	_____	_____

7. Date of first dive: \_\_\_\_\_
8. Date of last dive: \_\_\_\_\_
9. Estimated number of dives: \_\_\_\_\_
10. Names of All Divers (visiting divers **must** contact the FL Tech DSO at least 1 month in advance regarding eligibility to dive under the auspices of the FL Tech Dive Program)

Name	Depth Rating	Signature
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

11. Name, location, phone number of hospital closest to dive site:
12. Name, location, phone number of nearest recompression chamber.
13. List all available modes of transportation to be utilized (boats, autos, helicopter, etc) in the event of an emergency involving an injured diver.
14. Signature of Faculty Coordinator: \_\_\_\_\_  
Dept. \_\_\_\_\_ Phone \_\_\_\_\_

\*\* Any deviations to this dive plan **must** be reported to the FL Tech DSO **immediately**. Divers who fail to do so risk suspension of their FL Tech Diving privileges.

## Appendix 10.2

### Florida Tech Dive Card Approval Check List

- \_\_\_\_\_ Completed Application for Dive Card Approval (Appendix 10.3)
- \_\_\_\_\_ Proof of Dive Certification (copy of dive card showing front and back)
- \_\_\_\_\_ Completed Dive Physical Exam Form (Appendix 1, 2, 3)
- \_\_\_\_\_ Proof of CPR/AED certification (copy of CPR/AED card showing front and back)
- \_\_\_\_\_ Proof of Standard or Advanced First Aid
- \_\_\_\_\_ Proof of Oxygen Administration Training
- \_\_\_\_\_ Proof of Onsite/Field Neurological Assessment Training
- \_\_\_\_\_ Proof of First Aid for Hazardous Marine Life Training
- \_\_\_\_\_ Proof of Diver's Medical Insurance (copy of DAN card front and back, or medical insurance company and policy number)
- \_\_\_\_\_ Attend annual AAUS/Florida Tech Certification Lecture.
- \_\_\_\_\_ Pass annual exams on rules, regulations, theoretical and dive tables
- \_\_\_\_\_ Pass swimming evaluation (required for all first-time applicants)
- \_\_\_\_\_ Pass confined water checkout dive (required for all first-time applicants)
- \_\_\_\_\_ Pass open water checkout dive (required for all first-time applicants)
- \_\_\_\_\_ Complete 11 open water training dives (required for all first-time applicants)
- \_\_\_\_\_ Equipment maintenance forms (if using personal equipment). Proof of annual service of:  
Regulator
- \_\_\_\_\_ Pressure/depth gauge (or integrated dive computer)
- \_\_\_\_\_ Buoyancy compensator
- \_\_\_\_\_ Tank Visual Inspection Program
- \_\_\_\_\_ Tank (5 year) tank hydrostatic test (pencil trace of date stamped on tank).
- \_\_\_\_\_ Signed statement identifying which equipment, if any, that will be rented.
- \_\_\_\_\_ Emergency Card information (Appendix 10.4)

Dive cards will not be issued until ALL items on the Check List are completed. Allow at least one week after complete package is submitted to process dive card approval. **NO DIVES on Florida Tech projects are permitted until you are actually issued the dive card and it is in your possession.**

**NOTE: Possession of a AAUS/Florida Tech dive card DOES NOT automatically guarantee reciprocity with other AAUS organizations. Project Directors are responsible for coordinating any diving operations with other AAUS organizations.**

## Appendix 10.3 Application for Florida Tech Dive Card Approval

Name: \_\_\_\_\_ Student ID#: \_\_\_\_\_  
Campus Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Email: \_\_\_\_\_ Home Phone #: \_\_\_\_\_ Cell Phone #: \_\_\_\_\_

Permanent Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Phone #: \_\_\_\_\_  
Date of Birth: \_\_\_\_\_ Sex: \_\_\_\_\_ Age: \_\_\_\_\_

SCUBA Certification:  
Agency: \_\_\_\_\_ Level: \_\_\_\_\_  
Date of Certification: \_\_\_\_\_

Diver Medical Insurance Information (Company/Policy Number) \_\_\_\_\_

Description of training, experience, including number of logged dives:

Signature of Applicant: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of Course Instructor/Advisor (required if applicant is a student):  
\_\_\_\_\_

See Dive Card Approval Check List (Appendix 10.2) for additional items that must be submitted with this application. **Dive Cards will not be issued until all requirements are met.**

---

### FLORIDA TECH DIVE CARD

**Approval of Dive Safety Officer:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Approved Certification Level:** Diver in Training | Scientific Diver

**Depth Limitation:** 30 | 60 | 100 | 130 | 150 | 190

**Nitrox Certified:** Y | N

**Appendix 10.4**  
**Florida Tech Emergency Information Card**  
**For Dive Safety Officer**  
(Duplicate on 3 x 5 card or equivalent for Lead Diver)

Name: \_\_\_\_\_ Telephone: \_\_\_\_\_  
          (Last)           (First)       (MI)

In case of emergency, contact:

Doctor:

Social Security #: \_\_\_\_\_ Date of Birth: \_\_\_\_\_

Medical Insurance Company/Policy #: \_\_\_\_\_

Religion: \_\_\_\_\_

Allergies:

Other Medical Conditions:

# Appendix 10.5

## Florida Tech Pre-Dive Checklist – Lead Diver

Lead Diver \_\_\_\_\_  
Project Approval Number \_\_\_\_\_

The Lead Diver is responsible for detailed planning of all underwater activity and to establish and discuss a rescue plan with all divers before any diving takes place. The responsibility of the Lead Diver requires preparation several days before the actual dive takes place. If a large group of divers is involved, a general meeting is recommended to discuss operational procedures at the dive site.

The Lead Diver must be at the dive site during the entire dive operation.

\_\_\_\_\_ Do all divers have their Florida Tech Dive Certification Card?  
List the names of the divers at the dive site:

### **Mandatory on-site emergency equipment:**

- \_\_\_\_\_ - First aid kit
- \_\_\_\_\_ - Emergency oxygen kit
- \_\_\_\_\_ - Dive flag(s)
- \_\_\_\_\_ - Emergency information cards
- \_\_\_\_\_ - Emergency information cards

### **Mandatory personal equipment:**

- \_\_\_\_\_ - Mask, fins, snorkel
- \_\_\_\_\_ - Compressed air cylinder and valve
- \_\_\_\_\_ - Regulator (alternate air source is recommended)
- \_\_\_\_\_ - Buoyancy control device w/low pressure inflator
- \_\_\_\_\_ - Submersible pressure gauge
- \_\_\_\_\_ - Depth gauge
- \_\_\_\_\_ - Timing device
- \_\_\_\_\_ - Compass
- \_\_\_\_\_ - Adequate exposure protection
- \_\_\_\_\_ - Weight belt/weights w/quick release mechanism
- \_\_\_\_\_ - Slate
- \_\_\_\_\_ - Knife
- \_\_\_\_\_ - Night diving equipment (if applicable)
- \_\_\_\_\_ - Logbook
- \_\_\_\_\_ - PADI repetitive dive table

## **Appendix 10.5 (continued)**

### **Florida Tech Pre-Dive Checklist – Lead Diver**

#### **Review emergency procedures with divers**

- \_\_\_\_\_ - Lost diver procedures
- \_\_\_\_\_ - Emergency numbers
- \_\_\_\_\_ - Emergency evacuation procedures

#### **Review dive plan with all divers**

- \_\_\_\_\_ - Formation of buddy teams
- \_\_\_\_\_ - Remind buddy teams that Lead Diver directs all in water-dive activities
- \_\_\_\_\_ - Entry and exit areas
- \_\_\_\_\_ - Discuss dive objectives
- \_\_\_\_\_ - Evaluate water and weather conditions and decide to “go” or “abort dive
- \_\_\_\_\_ - Discuss known and potential underwater hazards
- \_\_\_\_\_ - Discuss location of emergency oxygen equipment, first aid kit and diving emergency management procedures (appendix 7)
- \_\_\_\_\_ - Ensure proper display of dive flag(s)
- \_\_\_\_\_ - Roll call
- \_\_\_\_\_ - Debriefing after a dive (perform roll call again)

#### **Remind divers**

- \_\_\_\_\_ - Fill out their Florida Tech Dive Log Sheets
- \_\_\_\_\_ - Include Project Approval Number

#### **List the time/depth limitations you imposed for dive(s):**

List any problems encountered:

As the Lead Diver for this project, I have discussed all the issues mentioned above and had at the dive site all the required mandatory equipment. I understand that failure to follow these guidelines, as well as the rules and regulations in the Florida Tech Dive Manual, may result in loss of diving privileges and cancelation of the Project Approval.

Signature of Lead Diver: \_\_\_\_\_

# Appendix 10.6

## Florida Tech Diving Log

(Dive logs MUST be logged electronically at <http://fit.diveaus.com/> as soon as possible following completion of dive activities. Failure to comply will result in suspension of diving privileges!)

Project Approval Number: \_\_\_\_\_ Date: \_\_\_\_\_  
Diver \_\_\_\_\_ Dive Buddy: \_\_\_\_\_  
Lead Diver: \_\_\_\_\_  
Location: \_\_\_\_\_  
Dive Start Time: \_\_\_\_\_ Dive End Time: \_\_\_\_\_ Total Bottom Time: \_\_\_\_\_  
Maximum Depth: \_\_\_\_\_ Visibility: \_\_\_\_\_  
Type or breathing gas: Air / Nitrox Nitrox percentage: \_\_\_\_\_

Surface Conditions:

Underwater Conditions:

Purpose of dive:

For this dive, the PADI dive tables / a dive computer (circle one) were utilized (if a computer was utilized, please specify make and model):

Comments (be sure to include details regarding any incidents or near incidents):

---

Project Approval Number: \_\_\_\_\_ Date: \_\_\_\_\_  
Diver \_\_\_\_\_ Dive Buddy: \_\_\_\_\_  
Lead Diver: \_\_\_\_\_  
Location: \_\_\_\_\_  
Dive Start Time: \_\_\_\_\_ Dive End Time: \_\_\_\_\_ Total Bottom Time: \_\_\_\_\_  
Maximum Depth: \_\_\_\_\_ Visibility: \_\_\_\_\_  
Type or breathing gas: Air / Nitrox Nitrox percentage: \_\_\_\_\_

Surface Conditions:

Underwater Conditions:

Purpose of dive:

For this dive, the PADI dive tables / a dive computer (circle one) were utilized (if a computer was utilized, please specify make and model):

Comments (be sure to include details regarding any incidents or near incidents):

---

## Appendix 10.7

### Florida Tech End of Project Report

Project # \_\_\_\_\_ Date of Last Dive: \_\_\_\_\_

Total Number of Dives: \_\_\_\_\_

Names of Divers Participating in Project.

- |    |     |
|----|-----|
| 1. | 6.  |
| 2. | 7.  |
| 3. | 8.  |
| 4. | 9.  |
| 5. | 10. |

(Use separate sheet for more names if necessary)

Dive logs turned in to Program Manager?                      Yes                      No

Please note below any problems, complications, aborted dives or deviations from original project. Use second sheet if more room is needed.