

# TEXAS A&M UNIVERSITY ARCHAEOLOGICAL DIVING SAFETY MANUAL

Texas A&M University (TAMU) is committed to preserving the health and safety of its students, staff, faculty, affiliates, and visitors, and to protecting the environment in which archaeological SCUBA diving occurs. This manual describes TAMU's general diving policy, diving regulations, certification criteria, medical standards, and emergency procedures to ensure diver safety standards for archaeological scientific diving.

The TAMU Archaeological Diving Safety Manual formalizes SCUBA diving standards and procedures as they relate to archaeological diving under the auspices of TAMU. This document outlines standards generally agreed upon by the scientific diving community and articulated in various forms by major institutions including the American Academy of Underwater Sciences (AAUS), the National Oceanic and Atmospheric Administration (NOAA), Indiana University, Scripps Institution of Oceanography, and the Institute of Nautical Archaeology (INA), which has been conducting underwater archaeological excavations and coastal surveys around the world in partnership with TAMU for more than four decades.

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## SECTION 1.0

### 1. GENERAL POLICY AND DEFINITIONS

#### 1.1. Archaeological Diving

Scientific diving is defined (OSHA code 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. For the purposes of this manual, the scientific research activity is archaeology and the collection of archaeological data.

#### 1.2. Archaeological Diving Safety

Archaeological diving safety within the Department of Anthropology on the main campus of Texas A&M University (TAMU) is administered through the following elements Archaeological Diving Safety Manual (1.3), which includes at a minimum: Procedures covering all operations specific to archaeological diving

1.2.1. Archaeological Diving Control Board or ADCB (1.4), which has the authority to: approve and monitor diving projects, review and revise the diving safety manual, insist on compliance with the manual, take disciplinary action in the event of non-compliance.

#### 1.3. Archaeological Diving Safety Manual (ADSM)

The Archaeological Diving Safety Manual sets forth basic SCUBA diving safety policies, regulations, and procedures for educational and research diving operations conducted by faculty, staff, and students of the Department of Anthropology at TAMU. This manual does not apply to TAMU faculty, staff, and students who engage in SCUBA diving activities that do not constitute archaeological research, or persons outside of or unaffiliated with the Department of Anthropology.

At a minimum, the ADSM must

- 1.3.1. establish criteria for minimum diver certification levels
- 1.3.2. provide standard emergency procedures
- 1.3.3. set standards for medical evaluation and renewal
- 1.3.4. establish minimum standards for equipment maintenance
- 1.3.5. The ADSM must be maintained. The manual will be updated as needed to reflect current diving safety practices and the revisions documented.

#### 1.4. Archaeological Diving Control Board (ADCB)

In accordance with a memo from the Anthropology Department Head dated 03 July 2018, the ADCB will be comprised of four voting members to include two representatives of the Nautical Archaeology Program (NAP), one of whom will serve as Chair of the

ADCB, a medical professional, and a student representative of the Anthropology Department. Future ADCB members will be appointed by the Department Head at the recommendation of the ADCB Chair and with the majority support of the ADCB. Members serve voluntarily for a period of three years and may serve an unlimited number of terms.

The ADCB shall

- 1.4.1. review and revise the Archaeological Diving Safety Manual as needed
- 1.4.2. advocate compliance with the Archaeological Diving Safety Manual
- 1.4.3. review and approve archaeological dive plans from archaeologists within or affiliated with the Department of Anthropology
- 1.4.4. ensure that SCUBA diving activities on TAMU archaeological projects are designed to minimize injury, illness, and death
- 1.4.5. serve as a sounding board for diver-related or diving safety concerns

The ADCB has the authority to

- 1.4.6. approve or reject archaeological dive plans from archaeologists within or affiliated with the Department of Anthropology
- 1.4.7. suspend diving programs that they consider to be unsafe
- 1.4.8. take disciplinary action in the event of unsafe practices

## **1.5. University Auspices**

- 1.5.1. Archaeological scientific diving under the auspices of TAMU occurs when TAMU faculty, staff, and/or students participate in an archaeological diving project for which TAMU faculty, staff, and/or students occupy any position of leadership or authority.
- 1.5.2. TAMU archaeological divers participating in an archaeological project carried out under the auspices of a university or organization other than TAMU must satisfy TAMU's Diver Qualifications (**1.6**) and be prepared to meet any additional requirements of the sponsoring institution.

## **1.6. Diver Qualifications**

All divers must

- 1.6.1. be certified as an Open Water Scuba Diver (or higher) by a recognized agency
- 1.6.2. complete a Diver Data and Contact Information form (Appendix A)
- 1.6.3. pass a physical examination specific to SCUBA diving using the Medical Examination form (Appendix B). This examination should be repeated every 5 years if under age 40, every 3 years if age 40-59, and every 2 years if age 60 and older

- 1.6.4. maintain current certifications in CPR, Basic First Aid, and Oxygen Administration through recognized agencies. Online training which lacks a physical skills component is not acceptable
- 1.6.5. maintain an insurance policy that covers diving-related accidents relevant to the area in which the diver will be working. In the U.S., Master or Preferred level insurance from the Divers Alert Network (DAN) is recommended. Outside the U.S., Guardian or Preferred level DAN insurance is recommended, if available

### **1.7. Waiver of Requirements**

In rare cases, the ADCB may grant a waiver of specific requirements if petitioned at least two months prior to the start of the project and if the waiver can be granted without risk to the diver, other divers, or project participants.

### **1.8. Lead Diver**

On a given archaeological project, one individual shall be designated as the Lead Diver. In some cases the Lead Diver may be the same person as the Principal Investigator (PI). The Lead Diver shall:

- 1.8.1. be certified as a Rescue Diver (or higher) by a recognized agency
- 1.8.2. be at the dive location during diving operations
- 1.8.3. ensure each project participant meets all requirements for archaeological diving
- 1.8.4. conduct an environmental assessment prior to putting team members in the water
- 1.8.5. participate in creation of safe daily dive plans in coordination with the project PI
- 1.8.6. ensure safety and emergency equipment is in working order and at the dive site
- 1.8.7. advise anyone who is ill, fatigued, injured, or apprehensive to not dive
- 1.8.8. brief divers on hazards and changes to the dive plan and/or emergency procedures
- 1.8.9. suspend diving operations in the event of unsafe conditions
- 1.8.10. report to the ADCB any diving-related physical injuries or psychological issues

### **1.9. Scientific Dive Plan Application (SDPA)**

Before conducting any archaeological diving under the auspices of TAMU, the Lead Diver or project PI must submit a SDPA (Appendix C) to the ADCB no less than 60 days before the start of the project. At a minimum, the SDPA must include:

- 1.9.1. each diver's qualifications and certifications
- 1.9.2. a Diver Data and Contact Information form (Appendix A) for each diver participating in the project
- 1.9.3. planned location and number of dives, with depths, expected water temperature, bottom times, and surface intervals, including specific information about repetitive / decompression dives and dive tables to be used

- 1.9.4. a Diving Accident Management Plan that includes emergency evacuation procedures (means of transport, routes, maps), the location of the nearest hospital, the nearest operational recompression chambers, and contact information for each
- 1.9.5. information about any anticipated hazards or dangerous conditions, such as cold water, low/zero visibility, strong current, soft mud, hazardous marine life, etc.
- 1.9.6. A hard copy of the signed and approved SDPA shall be kept on-site and be accessible during dive operations.

## **SECTION 2.0**

### **2. DIVING PROCEDURE**

Archaeological scientific diving shall not be conducted without established procedures for emergency evacuation of diver(s) to a hyperbaric chamber or appropriate medical facility, to be outlined in the SDPA (Appendix C) submitted to the ADCB at least 60 days prior to departure.

#### **2.1. Solo Diving Prohibition**

All archaeological diving conducted under the auspices of TAMU shall be planned and executed in such a manner as to ensure that every diver maintains constant, effective communication with at least one other comparably equipped, certified diver in the water. If loss of effective communication occurs within a buddy team, all divers shall surface and re-establish contact.

#### **2.2. Acclimation Dives**

Before working archaeological diving begins, all divers should conduct acclimation dives. These shall be non-working dives designed to familiarize divers with the site. Acclimation dives can be done in small groups. At sites that are 18m (60 ft) or deeper, the ADCB recommends the first acclimation dive should be to half the working depth and the second dive to working depth.

#### **2.3. Diver's Flag**

A diver's flag (Alpha or red Diver Down) shall be displayed prominently whenever diving is conducted as required by law or where water traffic is possible.

#### **2.4. Flotation Devices**

Each diver should have the capability of achieving and maintaining positive buoyancy. Personal flotation systems, buoyancy compensators, dry suits, or other variable volume buoyancy compensation devices shall be equipped with an exhaust valve.

#### **2.5. Timing Devices and Depth and Pressure Gauges**

Both members of a buddy pair must have an underwater time-keeping device, a depth indicator, and a submersible pressure gauge. If a computer is being used as a countdown timer, a watch must also be incorporated to note time, and as a backup in case of computer failure.

## **2.6. Dive Tables**

- 2.6.1. Due to the repetitive nature of archaeological diving, particularly during excavation or single site survey lasting a week or more, the ADCB recommends dive tables and not dive computers. US Navy *Table 9-7 No-decompression Limits and Repetitive Group Designators for No-decompression Air Dives* is designed for daily repetitive working dives.
- 2.6.2. The choice of dive tables is that of the Lead Diver and PI.
- 2.6.3. Hard copies of the dive tables should be at the dive site and with the daily dive log (2.7).

## **2.7. Daily Dive Log**

- 2.7.1. A daily log of all in-water activity should be kept, recording the date and name of the person completing the log, diver names, planned depth, planned bottom time, planned decompression, all relevant times (dive start, safety stop / decompression start, surface time, etc.) and notes explaining any deviations or anomalies. A sample daily dive log is included in Appendix D.
- 2.7.2. The daily dive log should stay at the dive site with the dive tables (2.6).
- 2.7.3. Each diver should maintain a separate record of his/her individual dives.
- 2.7.4. In the event of a diving emergency the daily dive log shall be provided to medical personnel.

## **2.8. Depth Limits**

- 2.8.1. A certified diver shall not exceed his or her depth certification unless accompanied by a diver certified to a greater depth. Exceptions may be made at the discretion of the Lead Diver and PI.
- 2.8.2. Diving deeper than 58m (190 ft), using either SCUBA or surface-supplied air, is not recommended, and shall require approval of the ADCB.

## **2.9. Recompression Chambers**

The ADCB encourages project PIs and Lead Divers to consider the practicality and desirability of having a recompression chamber on site, especially in remote locations where working dives are daily and repetitive. Approval of the SDPA requires the inclusion of a Diving Accident Management Plan (1.9.4) that provides the location and contact information for the two nearest hospitals and two nearest operational recompression chambers.

## **2.10. Ascent Rate**

Most recreational dive tables, as well as those of NOAA and the US Navy, use an ascent rate of 18m (60 ft) / minute or 1 ft / second. A slower rate of 9m (30 ft) / minute is recommended to maximize off-gassing while in water.

## **2.11. Surface Interval**

Planning should include the longest practical surface interval between dives, appropriate to the maximum depth. The ADCB follows the Divers Alert Network (DAN) in recommending no more than two dives per day, with a minimum surface interval of 5 hours for dives of 24m (80 ft) or more.

## **2.12. Safety Stops**

For all no-decompression dives deeper than 10m (30 ft), a precautionary safety stop is recommended at a depth of 5m (15 ft) for 3-5 minutes. The ADCB follows DAN in recommending extended safety stop times (even 2 extra minutes can be significant), and multiple safety stops for deeper dives, with the first being at one half the maximum depth of dives greater than 24m (80 ft).

## **2.13. Other Safety Considerations**

- 2.13.1. A First Aid kit and emergency oxygen shall be available at every dive site. The size shall be appropriate for the estimated time required to reach emergency medical personnel.
- 2.13.2. It is recommended that divers stay awake and in the company of a team member prepared to transport them to a decompression chamber if necessary, for at least 1 hour after surfacing from a dive.
- 2.13.3. Strenuous exercise should be avoided for at least 2 hours before and after a dive to allow for off-gassing of residual nitrogen in the bloodstream.
- 2.13.4. Alcohol consumption should be limited on nights prior to diving. An 8-hour interval should separate diving and alcohol consumption. DAN recommends no more than one drink (12 oz. beer / 6 oz. table wine / 2 oz. distilled 80-proof spirits) as alcohol increases the likelihood of dehydration, a known stimulant of decompression sickness (DCS).
- 2.13.5. The ADCB advises against diving more than 6 consecutive days.

## **2.14. Diving from Small and Rigid Inflatable Boats (RIBs)**

For dives conducted beyond a comfortable swimming distance from shore, in areas of strong current, arduous egress, or outside the no-decompression limits, a support boat and qualified operator must be in the immediate vicinity and ready to render assistance.



## **2.15. Surface-Supplied Air**

- 2.15.1. Divers shall be equipped with an independent reserve breathing gas supply if operating at a depth greater than 10 m (33 ft)
- 2.15.2. Each diver shall be hose tended by a separate team member while in the water. If the depth is 10 m (33 ft) or less, one tender may tend more than one diver.
- 2.15.3. The surface-supplied breathing gas supply shall be sufficient to support all divers in the water for the duration of the planned dive, including decompression.
- 2.15.4. All divers served by the same air source will remain at approximately the same depth during the dive and subsequent decompression.
- 2.15.5. If one diver aborts, all other divers on the same air source will also abort the dive.
- 2.15.6. All divers shall have a way of achieving positive buoyancy.
- 2.15.7. Surface-supplied diving will not take place if currents are greater than 1.5 knots.

## **2.16. Surface Support**

Adequate surface support should be available during all diving activities so that an injured diver(s) can receive immediate medical assistance. Surface support should consist of at least one person trained in CPR, Basic First Aid, and Oxygen administration as per ADSM requirements (1.6.4).

## **2.17. Enriched Air Nitrox**

- 2.17.1. Nitrox is any gas mixture with an oxygen concentration between 22 and 40 percent by volume.
- 2.17.2. All divers breathing Nitrox must be certified to do so by a nationally or internationally recognized organization.
- 2.17.3. Nitrox dive procedures should follow the tables of a nationally or internationally recognized certifying agency. These tables must be available at the dive site and should accompany the daily dive log.
- 2.17.4. If Nitrox is used to increase the safety margin of air dive tables, the maximum operating depth and oxygen exposure for Nitrox gases must not be exceeded.
- 2.17.5. Repetitive dives using Nitrox gases must comply with the specific dive tables used or as prescribed by the manufacturer of a Nitrox dive computer.
- 2.17.6. Individuals responsible for producing and/or analyzing Nitrox gases shall be trained and certified by a nationally or internationally recognized agency.
- 2.17.7. Divers using Nitrox must analyze their own tank mixture before diving.

## **2.18. Cave Diving**

All divers involved in cave diving must be trained in cave diving and all safety precautions and equipment must follow the cave diving requirements of a nationally or internationally recognized organization.

## **2.19. Deviations and Emergencies**

- 2.19.1. Any diver may deviate from the requirements of this manual to prevent or minimize a situation that is likely to cause death or serious physical harm.
- 2.19.2. The decision to dive resides with the diver. Divers may decline to dive for any reason, without fear of penalty or consequence.
- 2.19.3. It is the diver's responsibility and duty to refuse to dive if, in his or her judgment, conditions are unsafe or if they would be violating the precepts of their training
- 2.19.4. It is the diver's responsibility and duty to terminate a dive without fear of penalty whenever the diver feels that his/her physical condition is not conducive to safe diving, unless it compromises the safety of another diver already in the water.
- 2.19.5. If a dive is aborted there must be sufficient tank pressure to permit the diver to safely reach the surface / conduct decompression, or to reach an additional air source at the decompression station.

## **2.20. Reporting Incidents**

- 2.20.1. Any accident or incident that requires medical attention and can be linked to a diving injury or illness shall be reported immediately by the injured diver, or his/her dive buddy, to the project PI and/or the Lead Diver.
- 2.20.2. All diving incidents requiring recompression treatment, or resulting in moderate or serious injury, or death, shall be reported to the ADCB using the Incident Report Form (Appendix E) within 7 days.
- 2.20.3. If the ADCB chooses to investigate, they will do so using the Incident Report Form as well as supplementary documents such as medical reports, doctor's notes, the daily dive log, relevant correspondence, equipment records, etc.

## **2.21. Flying after diving**

- 2.21.1. Following a single no-decompression dive, the ADCB recommends a minimum preflight surface interval of 12 hours.
- 2.21.2. Following multiple dives in a day, multiple days of diving, or decompression diving, the ADCB recommends a minimum preflight surface interval of 24 hours.
- 2.21.3. Before ascending to altitude above 300m (1000 ft) by land transport, divers should follow the appropriate guideline for preflight surface intervals.

## **2.22. Personal Responsibility**

- 2.22.1. It is the diver's responsibility to ensure that personal diving equipment (BCDs and regulators) destined for use on a project has been serviced according to the manufacturer's recommendations.
- 2.22.2. It is the diver's responsibility to request proof that diving equipment (BCDs and regulators) provided by a project has been serviced according to the manufacturer's recommendations and reject equipment that has not been serviced.

- 2.22.3. It is the diver's responsibility to conduct a functional check of his or her diving equipment before a dive, preferably in the presence of a dive buddy.
- 2.22.4. On any given dive, it is the diver's responsibility to know the dive plan, breathing gas mixture, decompression schedules, and altitude corrections.
- 2.22.5. It is the diver's responsibility to ensure that they are in good health and not suffering from fatigue, injury, or illness that would adversely affect their safety or that of other divers.
- 2.22.6. It is the diver's responsibility to divulge any condition likely to affect adversely their safety and health or that of other divers.
- 2.22.7. No diver who is or thinks she might be pregnant should dive.
- 2.22.8. Each diver should maintain a record of his/her individual dives.
- 2.22.9. It is the diver's responsibility to report any physical problems, symptoms of decompression sickness, or equipment malfunction.
- 2.22.10. No diver shall be exposed to hyperbaric conditions against their will, except when necessary to prevent or treat a pressure-related injury.

### **2.23. Project Records**

The ADCB will maintain for a period of 5 years hard copy or electronic records of all submitted documents and certifications. The ADCB recommends that project PIs maintain their own copies of diving safety-related documents for a period of not less than 5 years.

### **2.24. Violation of Regulations**

Failure to comply with the regulations set forth in this manual may be cause for restriction, modification, or revocation of current or future archaeological diving activities under the auspices of TAMU.

## **SECTION 3.0**

### **3. DIVING EQUIPMENT**

TAMU does not maintain a dive locker. Diving equipment may be provided to team members by a project PI or divers may choose to use their own personal gear. In either case, buoyancy compensation devices (BCDs) and regulators must be regularly serviced by a qualified technician according to the manufacturer's recommendations and proof of this service must be available when requested by the project PI or Lead Diver.

#### **3.1. Primary equipment**

- 3.1.1. At a minimum, regulators must consist of a first stage, a primary second stage, an alternate air source, a submersible pressure gauge (SPG), and a low-pressure inflator hose (unless the accompanying BCD does not require an inflator hose).

Regulators should be serviced every 12 months or according to the manufacturer's recommendations, whichever is shorter.

- 3.1.2. Personal floatation systems, BCDs, dry suits, or other variable volume buoyancy compensators shall be equipped with an exhaust valve. These devices shall be inspected and tested every 12 months or according to the manufacturer's recommendations, whichever is shorter.

### **3.2. SCUBA Cylinders**

- 3.2.1. Cylinders shall be designed, constructed, and maintained in accordance with the applicable provisions of the Unfired Pressure Vessel Safety Code and the Department of Transportation (DOT).
- 3.2.2. Cylinders must be hydrostatically tested every 5 years in accordance with DOT and international standards.
- 3.2.3. Cylinders must have a visual inspection (VIP) at intervals not to exceed 12 months.
- 3.2.4. Cylinder valves shall be functionally tested at intervals not to exceed 12 months.

### **3.3. Secondary Equipment**

- 3.3.1. Each diver shall have a gauge for monitoring depth and maximum depth. A depth gauge is required even if a computer is being used.
- 3.3.2. Each diver shall have a timer for measuring dive duration. A watch or bottom timer is required even if a computer is being used.
- 3.3.3. All weight systems and flotation devices shall be equipped with a quick release designed to permit jettisoning. If the backpack and flotation device is an integral unit, the weight system shall be separate. If the weight system is also integrated into the backpack / flotation device, a way shall be devised to jettison the weights from the rest of the system. Quick release devices must operate easily with a single motion from either hand.
- 3.3.4. A First Aid kit and emergency oxygen shall be available at every dive site (2.13.1). Visit the DAN website ([www.alertdiver.com/first\\_aid\\_kits](http://www.alertdiver.com/first_aid_kits)) for guidance about building a First Aid kit appropriate for your specific dive site. Oxygen kits should be sized appropriately for the time required to reach emergency medical personnel.

### **3.4. Auxiliary Equipment**

- 3.4.1. Only divers trained in and comfortable with the deployment of lift bags shall be tasked with lifting operations. Lift bags should be of a greater capacity than the object to be lifted and generally should not exceed 45kg (100 lbs). BCDs shall not be used as a lifting device in lieu of lift bags.

- 3.4.2. Electrical tools and equipment used under water shall be designed specifically for that purpose. Electrical tools and equipment powered from the surface shall be de-energized before being placed into or retrieved from the water.
- 3.4.3. TAMU divers are not to engage in underwater torch cutting or welding.

### **3.5. Nitrox Equipment**

- 3.5.1. All equipment exposed to oxygen concentrations higher than 40% by volume at pressures above 200 psi shall be cleaned and maintained for oxygen clean service.
- 3.5.2. For Nitrox mixes of less than 40% created by the partial pressure method (first adding oxygen, then adding atmospheric air), dedicated SCUBA cylinders shall be cleaned and maintained for oxygen clean service.
- 3.5.3. For SCUBA cylinders filled with pre-mixed Nitrox, dedicated tanks are not required. However, any tank filled with any Nitrox mixture (greater than 21% O<sub>2</sub>) must be labeled NITROX or EANx and the label must reflect the contents to include the current percentage of oxygen, maximum operating depth, date of analysis, cylinder pressure, and the name or initials of the person who analyzed the gas.
- 3.5.4. All Nitrox mixtures shall be analyzed using an oxygen analyzer capable of reading a scale of 0 to 100% oxygen, within 1% accuracy. Oxygen analyzers shall be calibrated with air delivered at the same flow rate as the Nitrox to be analyzed. Oxygen sensors in oxygen analyzers shall be replaced every 12 months or sooner if the analyzer cannot be calibrated with air.
- 3.5.5. In keeping with advocacy for personal responsibility (2.22), the ADCB requires that individual divers test their own breathing gas.

### **3.6. Equipment not covered in this manual**

- 3.6.1. The use of rebreathers or closed circuit systems will be evaluated by the ADCB on a case-by-case basis
- 3.6.2. The use of specialized gas mixtures other than Nitrox will be evaluated by the ADCB on a case-by-case basis

## **SECTION 4.0**

### **4. BREATHING AIR**

#### **4.1. Minimum Standards**

- 4.1.1. Minimum oxygen: atmospheric (~21%)
- 4.1.2. Maximum carbon monoxide
  - 4.1.2.1. Decompression dives: 0.001% (10 ppm)
  - 4.1.2.2. Non-decompression dives: 0.002% (20 ppm)
- 4.1.3. Maximum carbon dioxide: 0.10% (1000 ppm)

- 4.1.4. Dust and droplets of oil and water: absent
- 4.1.5. Odors and vapors: absent
- 4.1.6. Special mixtures other than Nitrox must be approved by the ADCB

#### **4.2. Air Compressors**

- 4.2.1. Low-pressure compressors used to supply air directly to the diver shall be equipped with a volume tank and a check valve between the two. Compressors shall also have a pressure gauge, relief valve, and drain valve for each stage.
- 4.2.2. Compressed air systems over 500 psig shall have slow-opening shut-off valves. Ball valves may not be used in an oxygen or compressed air system over 500 psig.
- 4.2.3. All air intakes shall be located away from areas containing exhaust or other contaminants.
- 4.2.4. Gas and air analyses shall be performed on each breathing air compressor at regular intervals after 100 hours of operation or 6 months, whichever is shorter.
- 4.2.5. For each breathing air compressor a log shall be maintained showing operation, repair, filter changes, regular maintenance, and gas/air analyses.

#### **4.3. Oxygen Safety**

- 4.3.1. Except for umbilicals, components exposed to oxygen or mixtures containing oxygen over 40 percent by volume of shall be cleaned and maintained for oxygen clean service.
- 4.3.2. Oxygen systems over 125 psig shall have slow-opening shut-off valves.
- 4.3.3. Oxygen used for decompression or for mixing Nitrox shall meet the purity levels for Medical Grade (according to U.S. Pharmacopeia), Technical Diving Grade, or Aviator Grade standards.

### **SECTION 5.0**

## **5. MEDICAL STANDARDS**

### **5.1. Medical Evaluation**

- 5.1.1. All divers must pass a current diving physical examination and be declared by the examining physician fit to engage in diving activities within whatever limitations or restrictions are outlined in the Medical Examination form (Appendix B).
- 5.1.2. The diver has the right to choose his/her examining physician, but the ADCB recommends a physician trained in diving/hyperbaric medicine.
- 5.1.3. Physical examinations expire after 24, 36, or 60 months based on the age of the diver. Examinations should be repeated
  - 5.1.3.1. every 5 years if under age 40
  - 5.1.3.2. every 3 years if age 40-59
  - 5.1.3.3. every 2 years if age 60 and older

- 5.1.4. Physical examinations should also be conducted
  - 5.1.4.1. after any injury, illness, or surgery requiring hospitalization
  - 5.1.4.2. after any episode of unconsciousness
  - 5.1.4.3. after a diving accident resulting in injury to the diver
- 5.1.5. The diver must be free of any acute chronic disabling disease such as those conditions for which diving is generally restricted (Appendix B.2).

## **5.2. Content of Medical Evaluation**

- 5.2.1. Includes agreement to release medical information to the ADCB, whose membership includes a medical professional (1.4). Medical records shall be available to the physician attending a diver or former diver when released in writing by the diver.
- 5.2.2. General medical history
- 5.2.3. Diving-related medical history
- 5.2.4. Diving physical examination includes these elements:
  - 5.2.4.1. Chest x-ray, PA and lateral views (at discretion of examining physician)
  - 5.2.4.2. Visual acuity
  - 5.2.4.3. Color blindness (initial exam only, not a contraindication for diving)
  - 5.2.4.4. Cardiopulmonary assessment for all divers and an initial cardiovascular fitness assessment for all applicants 40 years and older
  - 5.2.4.5. Hearing test
  - 5.2.4.6. Complete blood count (CBC) and blood chemistry
  - 5.2.4.7. Complete urinalysis
  - 5.2.4.8. Pulmonary Function Testing (PFT)
  - 5.2.4.9. Electrocardiogram (EKG)
- 5.2.5. Any additional tests the examining physician may consider necessary (ECG, e.g.)

## **5.3. Results of Medical Evaluation**

Conditions which shall lead to restriction from diving are listed in Appendix B. The recommendation of the examining physician is a significant factor in the ADCB's review and approval process.

# **SECTION 6.0**

## **6. EMERGENCY PROCEDURES**

- 6.1. A victim of a diving accident can be any person who has been breathing air under water regardless of depth. It is essential that emergency procedures are pre-planned, that surface support is sufficient, and that medical treatment is initiated as soon as possible.

### **6.2. General Procedures**

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

- 6.2.1. Make appropriate contact with victim or rescue as required
- 6.2.2. Establish (A)irway, (B)reathing, (C)irculation as required
- 6.2.3. Stabilize the victim
- 6.2.4. Administer 100% oxygen, if appropriate (in cases of Decompression Sickness or near drowning)
- 6.2.5. Call local Emergency Medical System (EMS) for transport to nearest medical treatment facility. Explain the circumstances of the dive incident to the evacuation team(s), medic(s) and physician(s). If EMS cannot reach the dive site, initiate evacuation procedures.
- 6.2.6. Do not assume that emergency medical personnel understand why 100% oxygen may be required for the diving accident victim or that recompression treatment may be necessary.
- 6.2.7. Call DAN to establish contact with a diving physician and decompression chamber, etc.
- 6.2.8. Notify the ADCB
- 6.2.9. Complete and submit Incident Report Form (Appendix E) to the ADCB

- 6.3.** It is the responsibility of the project PI and/or Lead Diver to develop procedures for diving emergencies including evacuation and medical treatment for each dive location.