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SECTION 1.00 GENERAL POLICIES

1.10 PURPOSE

The purpose of the diving program is to ensure that all diving under the auspices of the National Aquarium (NATIONAL AQUARIUM) is conducted in a manner that will protect divers from accidental occupational injury and/or illness, and to set forth rules, regulations, and standards for training, certification, and operation. Fulfillment of these purposes shall be consistent with the Occupational Safety and Health Administration Regulations Part 1910 Subpart T.

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 the NATIONAL AQUARIUM, according to local procedure.

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.

1.11 Diving Manual

The purpose of this diving manual is to set forth minimal standards for establishment of NATIONAL AQUARIUM diving programs, the organization for the conduct of the programs, and the basic regulations and procedures for safety in diving operations.

1.12 Liability

In adopting the policies set forth in this manual, the NATIONAL AQUARIUM assumes no liability not otherwise imposed by law. Each diver is assumed under this policy to be voluntarily performing activities for which they assume all risks, consequences, and potential liability.

1.13 Review of Standards

An annual report and review of diving activities shall be prepared by the Dive Safety Officers of each program and submitted to the Dive Control Board.

1.20 CONTROL

1.21 NATIONAL AQUARIUM Auspices Defined
For the purposes of this manual the auspices of the NATIONAL AQUARIUM includes any operation with which the NATIONAL AQUARIUM is connected because of ownership of any equipment used, locations selected, or relationship with the individual(s). This includes all cases involving the operations of employees of the NATIONAL AQUARIUM, where such employees are acting within the scope of their employment, and the operations of volunteers and other persons who are engaged in authorized activities of the NATIONAL AQUARIUM or are diving as members of the NATIONAL AQUARIUM recognized organization.

1.22 Certification

No person shall engage in diving under the auspices of the NATIONAL AQUARIUM unless that person holds a valid NATIONAL AQUARIUM diving certification, pursuant to the provisions of this manual.

1.23 Equipment

All diving equipment used under the auspices of the NATIONAL AQUARIUM, regardless of ownership, shall conform to the standards set forth in this manual.

1.24 Sites

The regulations herein shall be observed at all locations where diving is carried out under the auspices of the NATIONAL AQUARIUM.

1.30 ORGANIZATION

1.31 Dive Safety Officer(s) (DSO)

a) Shall be an employee of the NATIONAL AQUARIUM and be a SCUBA Instructor for a nationally recognized agency.

b) Shall be responsible for the conduct of the diving programs. The operational authority for this program including the conduct of evaluation and certification, approval of dive plans, maintenance of diving records and ensuring compliance with this manual and all relevant regulations of the NATIONAL AQUARIUM rests with the Dive Safety Officer(s).

c) May permit portions of this program to be carried out by a qualified delegate responsible for the safe conduct of the local diving programs.

d) Shall be guided in the performance of the required duties by the advice of the Dive Control Board, but operational responsibility for the conduct of the local diving program will be retained by the DSO(s).

e) Shall suspend diving operations considered to be unsafe or unwise.
1.32 Dive Control Board (DCB)

a) Purpose
Diving is a critical element to achieving the mission of the NATIONAL AQUARIUM Institute. NATIONAL AQUARIUM divers are comprised of staff and volunteers that dive in various environments from controlled exhibits to open water field diving. The Dive Control Board oversees the rules and regulations that keep these divers safe. The Dive Control Board will strive to exceed the industry safety standards and be recognized within the Aquarium and Zoological community for its commitment to the safety of its divers.

b) Responsibilities
The NATIONAL AQUARIUM Dive Control Board:
1. Shall be responsible to the NATIONAL AQUARIUM Executive Director or their designee, and shall act as the official representative of the NATIONAL AQUARIUM in matters concerning the diving program.
2. Shall act as a Board of Appeal to consider diver related problems.
3. Shall recommend changes in policy and amendments to the diving manual as the need arises.
4. Shall establish and/or approve evaluation programs through which applicants for certification can satisfy the requirements of this manual.
5. Shall suspend diving operations or programs, which it considers to be unwise or unsafe.
6. Shall review new techniques or standards for NATIONAL AQUARIUM use.
7. Shall review annually the Dive Safety Officer(s)’s performance and program.
8. Shall sit as a Board of Investigation to inquire into the nature and cause of diving accidents.

c) Key Roles
1. Chairman
2. Vice-Chairman
3. Secretary
4. Board members
5. Consultants

d) Delegation
The Board may from time to time establish committees to assist in the evaluation and dissemination of its responsibilities.
1. Dive Safety Steering Committee.
2. Science Advisory Board will evaluate and advise the Dive Control Board on the soundness of the scientific standard applied to NATIONAL AQUARIUM diving.
3. Dive Safety Consultants; The NATIONAL AQUARIUM may from time to time have outside diving professionals review policies and procedures for the institute.
4. Venue based dive oversight groups.

e) Board Membership
Shall include all Dive Safety Officers, Assistant Dive Safety Officers, director or curatorial staff that has active diving under their direct supervision, NAI Safety and Risk Manager, Medical Advisor for the Dive Program, National Aquarium Legal Council and at least one active diver representative from both the paid and unpaid staff.
1. The majority of the board must be active NATIONAL AQUARIUM divers.
2. Board must attend a minimum of 75% of the annual meetings.
3. Board members may elect to send a representative if they must miss a meeting, but those representatives may not vote and it is understood they are there to supply necessary information pertaining to the given section.
4. The Board is committed to ensuring that its members have a broad range of skills, experience and expertise. This will assist the Board to maximize performance and ensure appropriate levels of shareholder return.
5. Board designees from within NATIONAL AQUARIUM INSTITUTE may change after communication and agreement by the Dive Control Board.

f) Review
The Board reviews its performance and Charter annually to ensure that it is operating effectively and in the best interests of NATIONAL AQUARIUM.

g) Process
The Board reviews will meet as frequently as required but must not meet less than four times each year.

1.33 DSO Designee

There are times when the Dive Safety Officer (s) will need to assign limited authorization to a designee for the purposes of overseeing a dive or for the purposes of conducting depth rating and check out dives. The applicant must fill out the DSO designee approval form and submit it to the DSO for the corresponding facility (Appendix xvii). The qualifications for this personnel will be different for On-Site versus Field diving.

a) Qualifications
1. On-Site:
   All personnel involved in operating as a DSO Designee under the auspices of the NATIONAL AQUARIUM shall hold a recreational qualification of Rescue Diver or higher. Individuals must also have been employed in a paid or unpaid capacity by the NATIONAL AQUARIUM for at least one year.
2. Field Diving
   All personnel involved in operating as a DSO Designee under the auspices of the NATIONAL AQUARIUM shall hold a recreational
qualification of Divemaster or higher. Individuals must also fill an advanced or management role within the National Aquarium Institute. For Biological Programs staff this would be considered a Senior Aquarist or equivalent level or higher.

b) Selection
Designee personnel will be selected by the Dive Safety Officer(s), who will solicit the advice of the Dive Control Board in conducting preliminary screening of applicants for these positions.

c) Limited Duties
Designee status will be assigned for a defined project with specific start and end dates or times. The designee will be assigned to fill very specific duties and not fully function as the DSO during the scope of the project or timeline.

1.34 Instructional Personnel

d) Qualifications
All personnel involved in diving instruction under the auspices of the NATIONAL AQUARIUM shall be qualified for the type of instruction being given.

e) Selection
Instructional personnel will be selected by the Dive Safety Officer(s), or designee, who will solicit the advice of the Dive Control Board in conducting preliminary screening of applicants for instructional positions.

1.35 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 could interfere with diving operations.

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

c) Planning dives in accordance with Section 2.21 Dive Plans

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

e) Briefing dive team members on:
   1. Dive objectives.
   2. Unusual hazards or environmental conditions that could 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 Dive Safety Officer and Dive Control Board any physical problems or adverse physiological effects including symptoms of pressure-related injuries.
   6. Conduct wellness inspections of each diver.
1.36 Reciprocity and Visiting Diver

a) Two or more institutions engaged jointly in diving activities, or engaged jointly in the use of diving resources, shall designate one of the participating Dive Control Boards to govern the joint dive project.

b) A certified diver from another institution shall apply for permission to dive at the NATIONAL AQUARIUM by submitting to the Dive Safety Officer a document containing all the information described in Appendix xii, signed by the Dive Safety Officer or Chairperson of the home Dive Control Board.

c) A visiting diver may be asked to demonstrate their knowledge and skills for the planned dive.

d) If the NATIONAL AQUARIUM denies a visiting diver permission to dive, the NATIONAL AQUARIUM Dive Control Board shall notify the visiting diver and their Dive Control Board with an explanation of all reasons for the denial.

1.37 Waiver of Requirements

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

1.40 VIOLATION OF REGULATIONS

1.41 Consequence of Violation of Regulations by NATIONAL AQUARIUM Divers

Failure to comply with the regulations of this manual, or those of a governmental sub-division not in conflict with this manual, may be cause for the revocation or restriction of the diver’s NATIONAL AQUARIUM certificate by action of the Dive Control Board.

1.42 Consequence of Violation of Regulations by the NATIONAL AQUARIUM

Failure to comply with the regulations of this standard may be cause for the revocation or restriction of the NATIONAL AQUARIUM’S recognition by AAUS.

1.50 RECORD MAINTENANCE

The Dive Safety Officer(s) or designee shall maintain permanent records in a secure location for each diver certified. The file shall include evidence of certification level, log sheets, results of current physical examination, reports of disciplinary actions by the Dive Control Board, and other pertinent information deemed necessary.

1.51 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 the NATIONAL AQUARIUM 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 diving under the auspices of the NATIONAL AQUARIUM diving program unless they hold a current certification issued by the Dive Safety Officer (s) and managed by the Dive Control Board pursuant to the provisions of this manual.

2.20 PRE-DIVE PROCEDURES

2.21 Dive Plans

Dives should be planned around the competency of the least experienced diver. Before conducting any diving operations under the auspices of the NATIONAL AQUARIUM, the Lead Diver for a proposed operation must formulate a dive plan using the On-Site Dive Plan Form or the Field Diving Form (Appendix iv and Appendix v) that should include the following:

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

b) Emergency plan 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.

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.

2.22 Pre-Dive Safety Checks
a) Diver’s Responsibility:
   1. 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 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

2.31 Scuba Operations

2.31.1 Personnel Required

A minimum of three (3) authorized certified divers are required for all buddy system SCUBA diving operations at NATIONAL AQUARIUM.

2.31.2 Personnel Assignments

   a) Tender: a qualified individual to oversee the dive, assist divers in and out of the water, and monitor divers in water and out.
   b) Buddy Teams: All divers shall work, with another equally equipped diver, in teams of two (2). Divers shall maintain constant visual contact with their buddy at all times.

2.31.3 Required Equipment

   a) Primary breathing gas supply- minimum of 1500psi at start of dive
   b) Alternate air source
   c) Regulator
   d) Buoyancy compensator
   e) Bottom timing device
   f) Gauges
   g) Weight belt
   h) Dive tables and/or dive computer
   i) Thermal protection
j) Gloves
k) Signaling device (open water only)

2.32 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.

2.33 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.

2.34 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.
c) The dive will be terminated if a diver fails to respond to communications or signals.
d) The dive should be terminated if a diver begins to use an alternate breathing gas supply.
e) The diver may request the termination of the dive at any time for any reason.

2.35 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 Dive Control Board explaining the circumstances and justifications.

2.40 POST-DIVE PROCEDURES

2.41 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) While diving outside the no-decompression limits is not permitted, in this unlikely event the diver 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.
2.50  EMERGENCY PROCEDURES

Diving safety is the primary concern of this manual and the primary responsibility of each diver who operates under the auspices of the NATIONAL AQUARIUM. In emergencies, when danger to life exists or is probable, divers may, at their own discretion, adopt courses of action different from those prescribed by these regulations where they honestly and reasonably believe that such deviations are required for safety purposes. A written report of all such actions shall be submitted to the Dive Safety Officer (s) explaining the circumstances and justifications for such action. The Dive Safety Officer (s) shall notify the Safety and Risk Manager who will then contact the Occupational Safety and Health Administration within forty-eight (48) hours of incident. The Dive Safety Officer (s) will submit documentation to AAUS for review.

2.51  In-water Procedures

2.51.1 Equipment Problem

a) Notify buddy.
b) Surface with buddy.
c) Notify tender and exit water if possible.

2.51.2 Medical Problem

a) Assist buddy.
b) Surface with buddy.
c) Notify tender and exit water if possible
d) Tender shall call for assistance as needed.

2.51.3 Diver Recall

The diver recall shall be used for any situation that requires the immediate exiting of divers from the water. The tender shall sound the recall. Upon hearing the recall all divers shall proceed immediately to the dive entrance and exit the water.

2.52  Water Safety Alert

An alert mechanism must be in place to summon assistance in the case of a water emergency. Reference the site-specific manuals for each facility’s mode of alert.

2.52.1 Use of the Alert

The alarm shall only be used in the event of a human emergency where assistance is required. The alarm is not to be used for animal emergencies.

2.52.2 Emergency Response
a) The tender will be most likely to activate the alert system. They will be responsible for directing and informing oncoming personnel as to the location and condition of the diver in trouble. They should also assist in any necessary First Aid and/or CPR.

b) Biological Programs staff and Security/First Responder personnel should respond immediately to a water safety alert, their primary responsibility is to assist with removing the diver from the water where first aid can be administered.

c) Security/First Responder personnel should follow the procedure outlined in Section 2.54 General Procedures for Diving Related Medical Problems or Emergencies of this manual.

2.53 Emergency Equipment

The minimum emergency equipment will consist of AED, oxygen kit, first aid kit, and throw ropes. Reference site-specific manuals for locations of required equipment.

2.54 General Procedures for Diving Related Medical Problems or Emergencies

a) Remove diver from the water if necessary.

b) Administer CPR if necessary.

c) Call First Responder. Inform them that a medical problem or emergency exists, its location and nature.

d) Assist EMT and other emergency personnel upon their arrival.

e) The responding EMT will make an assessment of the patient’s condition using the DAN Accident Management Cards (f) Appendix xvi). If in their opinion, serious injury or illness has occurred:

   1. Patient will be transferred via ambulance to the appropriate medical facility. (Appendix ii and Appendix iii)

   2. Program Dive Safety Officer(s) or designee will be notified as soon as possible.

   3. Program Dive Safety Officer(s) or designee will be responsible for notifying DAN and program medical advisor.

   4. Patient will not be permitted to dive again until cleared by a doctor.

g) If in the opinion of the EMT, only minor illness or injury has occurred:

   1. The EMT will administer first aid or appropriate treatment.

   2. The program Dive Safety Officer(s) or designee will be notified.

   3. The Dive Safety Officer(s) will determine whether further inspection or referral to DAN is necessary.

   4. Patient will not be permitted to dive further that day.

   5. The Dive Safety Officer(s) must approve the individual’s return to diving activities.

h) Ensure that First Responder, Dive Safety Officer(s) or Biological Programs staff member on duty promptly file incident reports.

2.55 Open Water Emergency Procedures
When a diver emergency occurs during any NATIONAL AQUARIUM sanctioned open water diving activities the following procedure should be used:

a) Remove diver from water.
b) Administer CPR or first-aid as necessary.
c) Call for assistance.
d) Boat Diving - Call US Coast Guard - VHF channel 16.
e) Shore Diving - Call 911.
f) Outside United States – call local authorities.
g) Call DAN (919) 684-8111 for referral or consultation.
h) Assist emergency personnel upon arrival.
i) Inform NATIONAL AQUARIUM Dive Safety Officer(s) and Safety/Risk Manager about nature of emergency and file incident report as soon as possible.

2.60 FLYING AFTER DIVING OR ASCENDING TO ALTITUDE (OVER 1000 FEET)

Following any dive, divers should have a minimum preflight surface interval of 24 hours. This also applies to ascending to altitude above (1000 feet) by land transport.

2.70 RECORD KEEPING REQUIREMENTS

2.71 Personal Diving Log

Each certified diver shall log every dive made under the auspices of the NATIONAL AQUARIUM and is encouraged to log all other dives. Standard forms will be provided by each facility. Log sheets shall be submitted to the Dive Safety Officer(s) to be placed in the diver’s permanent file. Details of the submission procedures are left to the discretion of the Dive Safety Officer(s). 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.

2.72 Required Incident Reporting

All accidents involving diving shall be reported to the Dive Safety Officer within 24 hours of the occurrence.

All diving incidents requiring recompression treatment, or resulting in moderate or serious injury, or death shall be reported to the NATIONAL AQUARIUM’s Dive Control Board and OSHA. The NATIONAL AQUARIUM’s regular procedures for incident reporting, including those required by the AAUS, shall be followed. The report will specify the circumstances of the incident and the extent of any injuries or illnesses. (Appendix viii)
Additional information must meet the following reporting requirements:
a) NATIONAL AQUARIUM shall 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 the NATIONAL AQUARIUM, with the record of the dive, for a period of 5 years:
   1. Complete NATIONAL AQUARIUM Dive Incident Report Form (Appendix viii)
   2. Written descriptive report to include:
      i. Name, address, phone numbers of the principal parties involved.
      ii. Summary of experience of divers involved.
      iii. Location, description of dive site, and description of conditions that led up to incident.
      iv. Description of symptoms, including depth and time of onset.
      v. Description and results of treatment.
      vi. Disposition of case.
      vii. Recommendations to avoid repetition of incident.
c) NATIONAL AQUARIUM 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. This report must first be reviewed and released by the NATIONAL AQUARIUM's Dive Control Board.

2.73 Permanent Records

The Dive Safety Officer(s) shall maintain permanent records for each individual diver certified. The file shall include copies of certification card(s) and other documents required by this manual. This information shall be made available to other diving agencies, upon request, but only following permission granted in writing by the diver in question for such action.

SECTION 3.00 DIVING EQUIPMENT

3.10 GENERAL POLICY

All equipment shall meet standards as determined by the Dive Safety Officer(s) and the Dive Control Board. Equipment that is subjected to extreme usage under adverse conditions should require more frequent testing and maintenance. All equipment shall be regularly examined by the person using them.

3.20 EQUIPMENT

3.20.1 Regulators

a) Only those makes and models specifically approved by the Dive Safety Officer(s) 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).

3.20.2 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.

3.20.3 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 (5 years).
c) Scuba cylinders must have an internal and external inspection at intervals not to exceed 12 months. Visual inspections will be tested to CGA and PSI standards.
d) Scuba cylinder valves shall be functionally tested at intervals not to exceed 12 months.

3.20.4 Harnesses and Weight Belts

Harnesses and weight belts shall be regularly examined by the persons using the equipment. All weight belts and SCUBA harnesses worn by the diver during diving shall be equipped with quick release devices and designed to permit jettisoning the entire gear. The quick-release device must operate easily with a single motion from either hand.

3.20.5 Gauges

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

3.20.6 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.

3.20.7 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. Depth gauges must be tested for accuracy every six (6) months. All pressure gauges must be inspected every twelve (12) months. Inaccurate gauges shall not be used.

3.20.8 Determination of Decompression Status: Dive Tables, Dive Computers

a) A set of diving tables, approved by the Dive Control Board, must be available at the dive location. (Appendix x)
b) Dive computers may be utilized in place of diving tables, and must be approved by the Dive Safety Officer(s). Guidelines for computers are as follows:
   1. Only those makes and models of dive computers specifically approved by the Dive Safety Officer(s) 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 Dive Safety Officer(s), 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.
   9. 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.
   10. Multiple deep dives require special consideration.

3.20.9 Snorkels

A snorkel must be carried by all NATIONAL AQUARIUM certified divers during all open-water diving operations.

3.20.10 Signaling Device

A signaling device such as a whistle, safety sausage, or mirror must be carried during open water diving activities.

3.20.11 Special Equipment
No specialized equipment shall be used while diving, without prior consent of the appropriate Dive Safety Officer(s).

3.20.12 Surface Supplied Air (SSA) Gear and Communications Equipment

No diver shall use any NATIONAL AQUARIUM SSA Gear or Communication Gear until they have been thoroughly trained and evaluated in its use by the Dive Safety Officer(s) or their designee.

3.20.13 Personal Gear

Personal dive gear may be used upon approval of the Dive Safety Officer(s) or designee after inspection (Appendix xi)

3.30 AUXILIARY EQUIPMENT

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

3.40 SUPPORT EQUIPMENT

3.41 First Aid Supplies
   a) First Aid Kit
   b) Bag Valve Mask
   c) Emergency oxygen kit
   d) First Aid Handbook
   e) List of telephone numbers of the nearest available hospitals and decompression chambers and the telephone number of DAN (Divers Alert Network).
   f) Two-way means of obtaining emergency assistance (i.e. Aquarium Radio, Marine VHF Radio, or Cellular Phone).

When diving in aquarium tanks and exhibits, the following additional equipment is also to be available:
   a) Back board
   b) Throw rope

3.42 Dive Flag

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

3.43 Compressor System at NATIONAL AQUARIUM

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.
d) Shall fill cylinders in a safe area or containment system.

3.50 EQUIPMENT MAINTENANCE

3.51 Record Keeping

Each equipment modification, repair, test, calibration, or maintenance service shall be logged, including the date and nature of work performed, serial number of the item, and the name of the person performing the work for the following equipment:
a) Regulators
b) Submersible pressure gauges
c) Depth gauges
d) Scuba cylinders
e) Cylinder valves
f) Diving helmets
g) Submersible breathing masks
h) Compressors
i) Gas control panels
j) Air storage cylinders
k) Air filtration systems
l) Analytical instruments
m) Buoyancy control devices
n) Dry suits

3.52 Compressor Operation and Air Test Records

a) Gas analyses and air tests shall be performed on each NATIONAL AQUARIUM-controlled breathing air compressor at regular intervals of no more than 100 hours of operation or 6 months, whichever occurs first. The results of these tests shall be entered in a formal log and be maintained.
b) A log shall be maintained showing operation, repair, overhaul, filter maintenance, and temperature adjustment for each compressor.
c) Only personnel, properly trained (PSI Fill Station Operator course) in their use, by the Dive Safety Officer(s) or their designees, will operate NATIONAL AQUARIUM breathing air compressor.
d) The Dive Safety Officer(s) shall be responsible for insuring that routine maintenance (oil and filter changes, etc.) is performed on the compressors according to the manufacturer’s specifications. Only qualified personnel shall perform compressor maintenance.

3.60 AIR QUALITY STANDARDS

Breathing air for scuba shall meet the following specifications as set forth by the Compressed Gas Association pamphlet C-6.
**CGA Grade E**

<table>
<thead>
<tr>
<th>Component</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>20 - 22%/v</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>10 PPM/v</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>1000 PPM/v</td>
</tr>
<tr>
<td>Condensed Hydrocarbons</td>
<td>Hydrocarbons 5 mg/m³</td>
</tr>
<tr>
<td>Total Hydrocarbons as Methane</td>
<td>25 PPM/v</td>
</tr>
<tr>
<td>Water Vapor ppm</td>
<td>(2)</td>
</tr>
<tr>
<td>Objectionable Odors</td>
<td>None</td>
</tr>
</tbody>
</table>

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

#### 4.11 Medical Examination

The applicant for training shall be certified by a licensed physician to be medically qualified for diving before proceeding with the training as designated in Section 4.20 SCUBA TRAINING (Appendix vii).

#### 4.12 Swimming Evaluation

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

1. **NATIONAL AQUARIUM Divers**
   a) Swim 300 yards continuously with mask, fins, and a snorkel in less than 14 minutes.
b) Tread water for 10 minutes or 2 minutes without the use of hands, without swim aids

c) Swim underwater without swim aids for a distance of 10 yards without surfacing.

d) With the use of swim aids, transport another person of equal size a distance of 25 yards in the water.

2. NATIONAL AQUARIUM Open Water Divers

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.

4.13 First Aid Requirements

The Divers Alert Network First Aid for Professional divers is the recommended course for learning the following skills; however, the Dive Safety Officer(s) or designee may approve other training.

a) Current CPR training

b) Current First Aid Skills

c) Oxygen Administration training

d) Bloodborne Pathogen training

e) Automated External Defibrillator (AED) training

f) Hazardous Marine Life First Aid training

4.20 SCUBA TRAINING

4.21 Practical Training

At the completion of training, the trainee must satisfy the Dive Safety Officer(s) 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.

b) Clear facemask.

c) Demonstrate air sharing, including both buddy breathing and the use of alternate air source, as both donor and recipient, with and without a facemask.

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.

4.22 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.

4.23 Open Water Evaluation

The trainee must satisfy an instructor, approved by the Dive Safety Officer(s), 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 NATIONAL AQUARIUM DIVER CERTIFICATION

5.10 CERTIFICATION
Submission of documents and participation in aptitude examinations does not automatically result in certification. The applicant must convince the Dive Safety Officer(s) and members of the Dive Control Board that they are sufficiently skilled and proficient to be certified. The signature of the Dive Safety Officer(s) will acknowledge this skill.

5.20 ENDORSEMENTS
Endorsements are required to perform specific types of diving at NATIONAL AQUARIUM. Any person performing a dive without proper endorsement shall have their certification revoked pending review by Dive Control Board. The applicant must satisfy the Dive Safety Officer(s) or the designee of their ability to perform the evaluation criteria.

5.30 STAFF CERTIFICATIONS
Certification types obtainable by both paid and un-paid staff of the NATIONAL AQUARIUM.

5.30.1 NATIONAL AQUARIUM Diver (A):

Diver is trained and proficient in the basics of diving. Diver must attain this level to be involved in any diving activity held under the auspices of the NATIONAL AQUARIUM.

Prerequisites:
- a) Must be a paid or volunteer staff member.
- b) Must be at least 18 years old.
- c) Must hold a nationally recognized SCUBA diving certification card.
- d) Must be trained in CPR/ First Aid/ Oxygen Administration and AED usage or achieve training within six months of entering dive program. (Training shall be kept current).
- e) Must pass a medical examination, as set forth in this manual, and follow the appropriate re-evaluation schedule.
- f) Must pass an evaluation conducted by the Dive Safety Officer(s), or their designee.
- g) Must not be known to be pregnant.
- h) Must sign Statement of Understanding (Appendix xiii).

Evaluation Criteria:
- a) Must meet all criteria set in Section SECTION 4.00 ENTRY-LEVEL TRAINING REQUIREMENTS.
- b) Demonstrate judgment adequate for safe diving.
- c) Demonstrate proficiency in control of neutral buoyancy.
- d) Demonstrate knowledge of applicable safety procedures.
- e) Demonstrate ability to follow instructions of husbandry personnel regarding interaction with animals.
f) Demonstrate ability to dive in a manner, which does not adversely affect the exhibit or the animals contained in it.

5.30.2 Communication Diver (C):

Diver is trained and proficient in the use of underwater communications equipment. (Includes full face and half mask)

Prerequisites: (A, E).

Evaluation Criteria:
   a) Demonstrate proper setup of communications gear (full face and half mask).
   b) Demonstrate proper donning and doffing of communications gear (full face and half mask).
   c) Demonstrate ability to clear full face or half mask.
   d) Demonstrate ability to communicate clearly while using full face or half mask.
   e) Demonstrate proper cleaning and storing of full face or half mask.

5.30.3 Diver Propulsion Vehicle (DPV):

Diver is trained and proficient in the use of diver propulsion vehicles (DPV).

Prerequisites: (A).

Evaluation Criteria:
   a) Demonstrate knowledge of diving techniques of using DPVs.
   b) Demonstrate proper cleaning and storing of DPV.

5.30.4 Dry Suit (D):

Diver is trained and proficient in the use of dry suits.

Prerequisites: Must hold a nationally recognized dry suit diving certification card, (A).

Evaluation Criteria:
   a) Demonstrate knowledge of diving techniques of using a dry suit.
   b) Demonstrate proper donning and doffing of suit.
   c) Demonstrate proper cleaning and storing of suit.

5.30.5 Exhibit Diver (E):

Diver is trained and proficient in feeding and presentation procedures for exhibits at any NATIONAL AQUARIUM facility (includes tender duties and topside talk).
Diver is trained and proficient in manual cleaning methods using hand brushes and wiping cloths.

Prerequisite: (A).

Evaluation Criteria:
   a) Demonstrate proper window cleaning technique.
b) Demonstrate proper decor cleaning techniques.
c) Demonstrate proper feeding techniques for animals.
d) Demonstrate ability to present topside speech to public.
e) Demonstrate knowledge and understanding of dive operation procedures.
f) Demonstrate knowledge of emergency procedures.

5.30.6 Fill Station Operator (FSO):

Diver is trained and proficient in use of cylinder fill station.

Prerequisites: Participated and completed Fill Station Operator course (external certification).
Evaluation Criteria:
   a) Demonstrated proficiency in safety and use of Fill Station.

5.30.7 Line Tended Diver (LTD)

Diver is trained and proficient in line tended diving defined as when a single diver enters the water with an attached safety line to perform a task. Line tended diving is considered a specialized diving technique that requires additional training and restrictions.

Prerequisites: (A, E).
Evaluation Criteria:
   a) Demonstrate knowledge of safety rules and procedures for line tended diving.
   b) Demonstrate proper line signals.

5.30.8 Mini-Scuba Unit (MSU):

Diver is trained and proficient in diving with the mini-scuba unit.

Prerequisites: (A, E).
Evaluation Criteria:
   a) Demonstrate knowledge of safety rules and procedures for MSU.
   b) Demonstrate proper setup and break down of MSU.

5.30.9 Open Water Diver (O):

Diver is trained and proficient in use of equipment and techniques required for open water diving.

Prerequisites: (A).
Evaluation Criteria:
   a) Surface dive to a depth of about 10 feet in open water without SCUBA.
b) Demonstrate proficiency in emergency air sharing techniques (octopus, pony bottle, etc.).
c) Demonstrate judgment adequate for safe diving.
d) Demonstrate removal and replacement of mask and regulator while submerged.
e) Demonstrate proficiency in leaving and boarding a diving support vessel while wearing SCUBA gear, where applicable.
f) Demonstrate proficiency in control of neutral buoyancy with power and oral inflator.
g) Depth ratings shall be based on depth of logged dives. The diver presenting a signed dive logbook, indicating dives within the range of the next depth rating may establish a depth rating with approval of Dive Safety Officer(s). Depth ratings are as follows.
   1. OI: 0-30 FSW
   2. OII: 31-60 FSW
   3. OIII: 61-100 FSW
   4. OIV: 101-130 FSW (*Dive Control Board Approval Needed)

5.30.10 Nitrox/Enriched Air (N):

Diver is trained and proficient in the use of Nitrox/Enriched Air breathing gas. Nitrox/Enriched Air diving is considered a specialized diving technique that requires additional training and restrictions.

Prerequisites: Must hold a nationally recognized Enriched Air / Nitrox diving certification card, (A, OII), and diver must obtain authorization by the Dive Control Board to use Enriched Air / Nitrox (Appendix ix).

Evaluation Criteria:
   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) Open water checkout dives, to appropriate depths, to demonstrate the application of theoretical and practical skills learned.

5.30.11 Power Scrubber (PS):

Diver is trained and proficient in use of power scrubber and associated equipment.

Prerequisite: (A, E, V).

Evaluation Criteria:
   a) Demonstrate knowledge of safety rules and procedures for power scrubber.
   b) Demonstrate proper setup and break down of power scrubber.
   c) Demonstrate proper handling and scrubbing techniques.

5.30.12 Power Washer (PW):
Diver is trained and proficient in use of power washer and associated equipment.

Prerequisite: (A, E, V).
Evaluation Criteria:
   a) Demonstrate knowledge of safety rules and procedures for power washer.
   b) Demonstrate proper setup and break down of power washer.
   c) Demonstrate proper handling and power washing techniques.

5.30.13 SAV Diver (G):

Diver is trained and proficient in use of equipment and techniques required for harvesting, planting and monitoring SAV.

Prerequisite: (A, OI).
Evaluation Criteria:
   a) Demonstrate knowledge of submerged aquatic vegetation planting techniques.
   b) Demonstrate ability to dive in low visibility water.

5.30.14 Scientific Diver (S):

Dive is trained and proficient in utilizing scientific methods while diving. This is a specialized diving technique requiring advanced certification and training.

Prerequisite: (A, OI), criteria listed in Section 6.30  SCIENTIFIC DIVER
Evaluation Criteria:
   a) Must meet requirements listed in Section 6.30  SCIENTIFIC DIVER

5.30.15 Scientific Diver in Training (ST):

Diver is in training to become a scientific diver.

Prerequisite: (A)
Evaluation Criteria:
   a) Must meet requirements listed in Section SECTION 4.00 ENTRY-LEVEL TRAINING REQUIREMENTS

5.30.16 Specimen Collector (SC):

Diver is trained and proficient in collecting specimens while on SCUBA.

Prerequisites: (A, OI).
Evaluation Criteria:
   a) Must demonstrate local animal identification knowledge.
   b) Must demonstrate proper collection techniques.
   c) Must be able demonstrate proper buoyancy control.
5.30.17 Surface Supplied Air Diver (SSA):

Diver is trained and proficient in the use of surface supplied air.

Prerequisites: (A, E).
Evaluation Criteria:
   a) Demonstrate proper setup of Surface Supplied Air gear (full face and half mask).
   b) Demonstrate proper donning and doffing of Surface Supplied Air gear (full face and half mask).
   c) Demonstrate proper cleaning and storing of full face or half mask.

5.30.18 Tender (T):

Diver is trained and proficient in all aspects of dive operations. Tender is responsible for safety of divers.

Prerequisites: (A).
Evaluation Criteria:
   a) Demonstrate knowledge of safety rules and procedures for dive operations.
   b) Demonstrate proper emergency procedures.

5.30.19 Vacuum Operator (V):

Diver is trained and proficient in use of Hydro Cleaner and Pool Vacuum and associated equipment.

Prerequisite: (A).
Evaluation Criteria:
   a) Demonstrate knowledge of safety rules and procedures for mobile and built-in vacuum systems.
   b) Demonstrate proper setup and break down of mobile and built-in vacuum systems.
   c) Demonstrate proper technique in use of vacuum.

5.40 TEMPORARY CERTIFICATIONS

5.41 Description

Temporary dive certifications are issued to individuals diving under the auspices of the NATIONAL AQUARIUM on a temporary basis. Temporary certification is valid only for the time period prescribed by the Dive Safety Officer(s).

5.42 Classification

a) Guest Diver
   Recommended by respective department director or higher in writing, with a statement indicating the reason(s) the dives are being
made and approved by Dive Safety Officer(s) for a recreational dive at NATIONAL AQUARIUM. Guest divers include VIP, PR/Media, reward, and reciprocity divers.

b) Contractor
   Recommended by Safety/Risk Manager in writing, with a statement indicating the reason(s) the dives are being made and approved by Dive Safety Officer(s) to conduct commercial dive operations at NATIONAL AQUARIUM.

c) Paid Guest Diver
   Arranged strictly through the Paid Guest Diver Program. All Paid Guest Divers will be supervised via a NATIONAL AQUARIUM staff member and contract facility staff members.

5.43 Requirements

a) Guest Diver:
   1. Must have Dive Safety Officer(s) approval.
   2. Must be at least 18 years old.
   3. Must hold a nationally recognized SCUBA diving certification card.
   4. Must submit completed Medical History Questionnaire for review of Dive Safety Officer(s) and/or Medical Advisor for approval (Appendix vii).
   5. Must sign a Statement of Understanding (Appendix xiii).
   6. Must not be known to be pregnant.
   7. Must have completed Form of Reciprocity from home organization. See Appendix xii (Reciprocity Divers Only).

b) Contractor:
   1. Must have Dive Safety Officer(s) approval.
   2. Must be at least 18 years old.
   3. Must hold a nationally recognized SCUBA diving certification card.
   4. Must submit completed Medical History Questionnaire for review of Dive Safety Officer(s) and/or Medical Advisor for approval (Appendix vii).
   5. Must sign a Statement of Understanding (Appendix xiii).
   6. Must have completed all appropriate paperwork completed for the job.

b) Contractor:
   1. Must have Dive Safety Officer(s) approval.
   2. Must be at least 18 years old.
   3. Must hold a nationally recognized SCUBA diving certification card.
   4. Must submit completed Medical History Questionnaire for review of Dive Safety Officer(s) and/or Medical Advisor for approval (Appendix vii).
   5. Must sign a Statement of Understanding (Appendix xiii).
   6. Must dive only under the supervision of the Dive Safety Officer(s) or their designee.
8. Must not be known to be pregnant.

5.50 REVOCATION OF CERTIFICATION

A diving certificate may be revoked or restricted by the Dive Control Board. Violations of regulations set forth in this manual or violations of Municipal, State or Federal laws, or other governmental sub-divisions not in conflict with this manual may be considered cause. The Dive Control Board shall give notice to the diver, in writing, of the reasons(s) for revocation. The diver will be given the opportunity to present their case in writing for reconsideration and/or rectification, within 30 days of notice.

5.60 RE-CERTIFICATION

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

5.70 DEPTH CERTIFICATION

5.71 Obtaining Depth Certification

A certified diver diving under the auspices of the NATIONAL AQUARIUM 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 Dive Safety Officer(s).

Depth Certification Progression is as follows:

a) Certification to 30 Foot Depth - Initial permit level.

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, 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 and must attain approval by the Dive Control Board to operate at these depths.

5.72 Minimum Activity to Maintain Certification

During any 12-month period, each NATIONAL AQUARIUM diver must log at least one dive near the maximum depth of the diver’s certification during each 6-
month period. Failure to meet these requirements may be cause for revocation or restriction of certification.

5.73 Re-qualification of Depth Certificate

Once the initial certification requirements of Section 5.71 Obtaining Depth Certification are met, divers whose depth certification has lapsed due to lack of activity may be re-qualified by procedures adopted by the NATIONAL AQUARIUM.

SECTION 6.00 SPECIALIZED DIVING GUIDELINES

6.10 LINE TENDED DIVING GUIDELINES

6.11 Restrictions

Dives to be conducted only in areas approved by Dive Control Board and/or Dive Safety Officer(s).

6.12 Personnel Requirements/Assignments

A minimum of two (2) NATIONAL AQUARIUM certified divers, familiar with line signals.

a) Standby Diver/Tender: A diver at the dive site with equipment at the ready to assist any diver in trouble.

b) Primary Diver: The diver who shall perform the required task.

6.13 Equipment

6.13.1 Primary Breathing Gas Supply

Each diver shall have a Primary Breathing Gas Supply (cylinder), which under normal operating conditions will allow the diver to complete the assign task. All divers shall have at least 1500 psi at the start of any dive. The NATIONAL AQUARIUM only allows divers to use standard filtered compressed air at the Baltimore and DC facilities. Enriched Air is not permitted for use in Line Tended Diving.

6.13.2 Alternate Breathing Gas Supply

An Alternate Breathing Gas Supply (Alternate air source, J valve, pony bottle, Spare-air, etc.) must be used by all NATIONAL AQUARIUM certified divers during all Line Tended Diving operations.

6.13.3 Regulator

All divers shall use a regulator approved by the Dive Safety Officer(s).
6.13.4 Buoyancy Compensators

Each diver shall, on every dive, wear a buoyancy compensator, which has been approved by the Diving Safety Officer(s).

6.13.5 Gauges

Submersible tank pressure gauges are required on all dives. A timekeeping device shall be present at all dive sites. On dives exceeding 30 feet, all divers must have a watch or bottom timer. Dive Computers may be used as a depth gauge and bottom timer.

6.13.6 Weight Belts

All weight belts worn by the diver during SCUBA diving shall be equipped with quick release devices and designed to permit jettisoning the entire gear. The quick-release device must operate easily with a single motion from either hand.

6.13.7 Safety Line

The Safety Line shall be attached to the divers’ buoyancy compensator, and hand tended at the surface.

6.13.8 Dive Tables

A set of approved Dive tables shall be at all dive sites.

6.14 Procedure

6.14.1 Pre-dive Briefing

The tender shall conduct a pre-dive briefing to insure:

a) The divers are physically able to perform dive and understand the reporting procedure for problems.
b) All divers understand task they are assigned.
c) All divers understand the safety procedures for the specific mode and dive location.

6.14.2 Pre-dive Check

The tender shall insure:

a) All divers perform a self-equipment check.
b) Log divers and their in-water time.

Note: See Pre-dive Check List in Appendix xiv

6.14.3 Procedure during Dive
The tender shall check, via line signals, on the status of the diver and monitor the dive site for problems.

6.14.4 Post Dive

The tender shall note divers out of water time. The tender shall check with the diver concerning problems encountered during dive.

6.15 Emergency Procedures

6.15.1 Equipment Problems

a) Notify tender of problem via line signal, 4 pulls.
b) Notify tender of diver surfacing via line signal, 3 pulls.
c) Surface and exit water.

6.15.2 Loss of Communication

a) Attempt to re-contact via line signal, 2 pulls.
b) Retrieve diver with Safety Line, ascent rate not to exceed 1 ft./second.
c) If unable to retrieve with Safety Line, send standby diver.
d) Tender shall call for assistance.

6.15.3 Diver Recall

The Diver Recall shall be used for any situation that requires the immediate exiting of divers from the water. The tender shall sound the recall. Upon hearing the recall the diver shall acknowledge diver recall with 3 pulls on safety line and surface immediately with an ascent rate not to exceed 1 ft./second.

6.20 NITROX / ENRICHED AIR DIVING GUIDELINES

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

6.21 Prerequisites

a) Eligibility

Only a certified Aquarium Diver diving under the auspices of the NATIONAL AQUARIUM with Dive Control Board approval is eligible for authorization to use 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 5.70 DEPTH CERTIFICATION.

b) Application and Documentation
Application and documentation for authorization to use nitrox should be made on forms specified by the Dive Control Board (Appendix ix).

6.22 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 Dive Safety Officer(s) and members of the Dive Control Board that they are sufficiently skilled and proficient. The applicant must also justify Nitrox use on the field diving plan request on a per trip basis. The signature of the Dive Safety Officer(s) 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 Dive Safety Officer(s) or Dive Control Board 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:

a) Training
The diver must complete additional theoretical and practical training beyond the NATIONAL AQUARIUM DIVER (A) level, to the satisfaction of the NATIONAL AQUARIUM Dive Safety Officer(s) and Dive Control Board.

b) Examinations
Each diver should demonstrate proficiency in skills and theory in written, oral, and practical examinations covering:
1. Written examinations covering the information presented in the classroom training session(s) (i.e., gas theory, oxygen toxicity, partial pressure determination, etc.);
2. Practical examinations covering the information presented in the practical training session(s) (i.e., gas analysis, documentation procedures, etc.);
3. Open water checkout dives, to appropriate depths, to demonstrate the application of theoretical and practical skills learned.

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

6.23 Nitrox Training Guidelines

Training in these guidelines should be in addition to training for NATIONAL AQUARIUM diver (A) authorization (Section SECTION 4.00 ENTRY-LEVEL TRAINING REQUIREMENTS). It may be included as part of training to satisfy the Scientific Diver training requirements (Section 6.30 SCIENTIFIC DIVER).

a) Classroom Instruction
1. 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.

2. Dive Control Board 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.

b) Practical Training

The practical training portion will consist of a review of skills as stated for SCUBA (Section SECTION 4.00 ENTRY-LEVEL TRAINING REQUIREMENTS), with additional training as follows:

1. Oxygen analysis of nitrox mixtures.
2. Determination of MOD, oxygen partial pressure exposure, and oxygen toxicity time limits, for various nitrox mixtures at various depths.
3. Determination of nitrogen-based dive limits status by EAD method using air dive tables, and/or using nitrox dive tables, as approved by the Dive Control Board.
4. Nitrox dive computer use may be included, as approved by the Dive Control Board.

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2. Determination of MOD, oxygen partial pressure exposure, and oxygen toxicity time limits, for various nitrox mixtures at various depths.
3. Determination of nitrogen-based dive limits status by EAD method using air dive tables, and/or using nitrox dive tables, as approved by the Dive Control Board.
4. Nitrox dive computer use may be included, as approved by the Dive Control Board.
d) 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.

6.24 Nitrox Diving Regulations

a) Dive Personnel Requirements
1. Nitrox Diver In Training - A diver in training, who has completed the requirements of Section SECTION 4.00 ENTRY-LEVEL TRAINING REQUIREMENTS and the training and authorization sections of these guidelines, may be authorized by the Dive Safety Officer(s) 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.

2. NATIONAL AQUARIUM Diver – A NATIONAL AQUARIUM Diver who has completed the requirements of section 5.30.1 NATIONAL AQUARIUM Diver (A): and the training and authorization sections of these guidelines, may be authorized by the Dive Safety Officer(s) to use nitrox. Depth authorization to use nitrox should be the same as those specified in the diver's authorization, as described in Section 5.30.10 Nitrox/Enriched Air (N):.

3. 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 NATIONAL AQUARIUM's Standards. Lead Diver authorization for nitrox dives by the Dive Safety Officer(s) and/or Dive Control Board should occur as part of the dive plan approval process.

4. The Lead Diver should:
   • As part of the dive planning process, verify that all divers using nitrox on a dive are properly qualified and authorized;
   • 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.

   The Lead Diver should also reduce the maximum allowable PO2 exposure limit for the dive team if on-site conditions so indicate

b) Dive Parameters
1. Oxygen Exposure Limits
   • 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”
   • The maximum allowable exposure limit should be reduced in cases where cold or strenuous dive conditions, or extended
exposure times are expected. The Dive Control Board 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 pO2 exposure limits if conditions indicate.

- 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.

2. Bottom Time Limits
   - Maximum bottom time should be based on the depth of the dive and the nitrox mixture being used.
   - 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.

3. Dive Tables and Gases
   - A set of Dive Control Board approved nitrox dive tables should be available at the dive site.
   - When using the equivalent air depth (EAD) method, dives should be conducted using air dive tables approved by the Dive Control Board.
   - 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.
   - 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.

4. Nitrox Dive Computers
   - Dive computers may be used to compute decompression status during nitrox dives. Manufacturers’ guidelines and operations instructions should be followed.
   - Use of Nitrox dive computers should comply with dive computer guidelines included in the NATIONAL AQUARIUM Standards.
   - 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 Dive Safety Officer(s) or designee.
   - 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.
   - Dive computers capable of pO2 limit and fO2 adjustment should be checked by the diver prior to the start each dive to assure compatibility with the mix being used.

5. Repetitive Diving
• Repetitive dives using nitrox mixtures should be performed in compliance with procedures required of the specific dive tables used.
• 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.
• 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.
• 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.

6. Oxygen Parameters

Authorized Mixtures - Mixtures meeting the criteria outlined herein may be used for nitrox diving operations, upon approval of the Dive Control Board.

• 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 placed in contact with oxygen concentrations greater than 40% or used in nitrox production by the partial pressure mixing method with gas mixtures containing greater than 40% oxygen as the enriching agent. The air purity should meet CGA Grade E (Section 3.60 AIR QUALITY STANDARDS) standards with condensed hydrocarbons not to exceed 5mg/m3 and hydrocarbon contaminants no greater than 0.1 mg/m3.

7. Analysis for NATIONAL AQUARIUM Personnel Requirements:

• Individuals responsible for analyzing nitrox mixtures should be knowledgeable and experienced in all aspects of the technique.

• Only those individuals approved by the Dive Safety Officer(s) and/or Dive Control Board should be responsible for analyzing nitrox mixtures.

• Production Methods - It is the responsibility of the Lead Diver to determine production method and include on Field Diving Plan request and is subject to the approval of the Dive Safety Officer(s).

Analysis Verification by User:

• 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: $\text{fO}_2$, MOD, cylinder pressure, date of analysis, and user's name.

- Individual dive log reporting forms should report $\text{fO}_2$ of nitrox used, if different than 21%.

6.25 Nitrox Diving Equipment

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

- Labeled SCUBA Cylinders
- Oxygen Analyzers

a) Oxygen Cleaning and Maintenance Requirements

1. Requirement for Oxygen Service

- 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.

- 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.

2. Scuba Cylinder Identification Marking

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

- Cylinders should be marked “NITROX”, “EANx”, or “Enriched Air”. 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.

- 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.

- Other markings, which identify the cylinder as containing gas mixes other than Air, may be used as the approval of the Dive Control Board.

- A contents label should be affixed, to include the current $\text{fO}_2$, date of analysis, and MOD.

- The cylinder should be labeled to indicate whether the cylinder is prepared for oxygen or nitrox mixtures containing greater than 40% oxygen.
3. **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.

4. **Other Support Equipment**
   - 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.
   - All diver and support equipment should be suitable for the fO2 being used.

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

6. **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.

### 6.30 SCIENTIFIC DIVER

#### 6.31 Certification Types

6.31.1 **Scientific Diver Certification**

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

6.31.2 **Temporary Diver Permit**

This permit constitutes a waiver of the requirements of Section SECTION 4.00 ENTRY-LEVEL TRAINING REQUIREMENTS 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 Dive Safety Officer(s). 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 Dive Safety Officer(s) 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 Dive Safety Officer(s) 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.

6.32 General Policy

AAUS requires that no person shall engage in scientific diving unless that person is authorized by the NATIONAL AQUARIUM pursuant to the provisions of this standard. Only a person diving under the auspices of the NATIONAL AQUARIUM that subscribes to the practices of AAUS is eligible for a scientific diver certification.

6.33 Requirements for Scientific Diver Certification

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

6.33.1 Prerequisites

a) Application - Application for certification shall be made to the Diving Safety Officer(s) on the form prescribed by the NATIONAL AQUARIUM (Appendix xv).

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 SECTION 7.00 MEDICAL STANDARDS and

c)

d)

e) ).

f) 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 SECTION 4.00 ENTRY-LEVEL TRAINING REQUIREMENTS.

6.33.2 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.
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 SECTION 4.00 ENTRY-LEVEL TRAINING REQUIREMENTS (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 Dive Safety Officer(s).
d) Examinations:
   1. Written examination
      • General exam required for scientific diver certification.
      • Examination covering the suggested topics at the Dive Safety Officer’s discretion.
   2. Examination of equipment.
      • Personal diving equipment
      • Task specific equipment

6.33.3 Depth Certifications

Depth certification and progression for scientific diver certification follow those established for NATIONAL AQUARIUM diver (A) found in Section 5.70 DEPTH CERTIFICATION.
6.33.4 Continuation of Certificate

a) Minimum Activity to Maintain Certification
   During any 12-month period, each certified scientific diver must log a minimum of 6 dives. At least one dive must be logged near the maximum depth of the diver’s certification during each 6-month period. Failure to meet these requirements may be cause for revocation or restriction of certification.

b) Re-qualification of Depth Certificate
   Once the initial certification requirements of Section 6.30 SCIENTIFIC DIVER are met, divers whose depth certification has lapsed due to lack of activity may be re-qualified by procedures adopted by the NATIONAL AQUARIUM.

6.33.5 Medical Examination

All certified scientific divers shall pass a medical examination at the intervals specified in Section 7.12 Frequency of Medical Evaluations. After each major illness or injury that may impact diving activities, a certified scientific diver shall receive clearance to return to diving from a physician before resuming diving activities.

6.33.6 Emergency Care Training

The scientific diver must provide proof of training in the following:
   a) Adult CPR (must be current).
   b) Emergency oxygen administration (must be current)
   c) First aid for diving accidents (must be current)

6.40 SURFACE SUPPLIED AIR DIVING

Surface Supplied Air (SSA) diving, under the auspices of NATIONAL AQUARIUM, shall use a cylinder on the surface, which shall supply air to the diver via an umbilical to a full-face or half mask.

6.41 Restrictions

Surface-Supplied Air Dives shall be conducted only in areas approved by Dive Control Board and/or Dive Safety Officer(s).

6.42 Personnel Required/Assignments

A minimum of two (2) NATIONAL AQUARIUM Surface-Supplied Air certified divers.
   a) Tender: Is the designated person in charge of the dive. Shall be thoroughly trained in all aspects of the dive operation. Is responsible for the safety of the dive operation. Shall maintain the log of diver bottom times and jobs performed.
b) Diver: The diver who shall perform the required task.

6.43 Equipment

All Surface-Supplied Air diving operations shall be conducted utilizing the Surface-Supplied Air cart. The cart incorporates the following equipment:

6.43.1 Breathing Gas Supply

The Breathing Gas Supply (cylinder) shall be 80 or 100 cubic feet. The cylinder shall have at least 1500 psi at the start of any dive.

6.43.2 Reserve Breathing Gas Supply

A diver carried reserve breathing gas supply for each diver.

6.43.3 Umbilical

The umbilical shall comprise:
   a) Breathing Gas Supply hose
   b) Communication Cable
   c) Strength Member
   d) Non-return valve at the mask attachment point
   e) Marked in 10’ increments beginning at the diver’s end of the line.

6.43.4 Regulator

The regulator has been adjusted for surface Supplied Air.

6.43.5 Weights & Harness

The diver shall wear a harness with positive locking device during Surface Supplied Air diving. The weight harness is equipped with a quick release device, designed to permit jettisoning the weights without removing the harness. The weight harness is equipped with a D ring for attaching the umbilical.

6.43.6 Dive Tables

A set of approved Dive tables shall be at all dive sites.

6.43.7 Masks

Only Dive Safety Officer(s) approved full face mask and or half mask may be used with the Surface Supply unit.

6.44 Procedure
6.44.1 Pre-dive Briefing

The tender shall conduct a pre-dive briefing to ensure:
   a) The divers are physically able to perform dive and understand the
      reporting procedure for problems.
   b) All divers understand task they are assigned.
   c) All divers understand the safety procedures for the specific mode and
dive location.

6.44.2 Pre-dive Check

The tender shall insure:
   a) All divers perform a self-equipment check.
   b) Log divers and their in-water time.
   Note: See Pre-dive Check List in Appendix xiv

6.44.3 Procedure during Dive

   a) The tender shall check, via line voice communications, on the status
      of the diver and monitor the dive site for problems.
   b) The diver will be continuously tended while in the water.

6.44.4 Post Dive

The tender shall note divers out of water time. The tender shall
check with the diver concerning problems encountered during dive.

6.45 Emergency Procedures

6.45.1 Equipment Problems

   a) Notify tender of problem via voice communications or line signal, 4
      pulls.
   b) Notify tender of diver surfacing via voice communications or line signal,
      3 pulls.
   c) Surface and exit water.

6.45.2 Loss of Voice Communication

   a) Attempt to re-establish voice communications.
   b) Contact diver via line signal, 4 pulls, to surface.
   c) Retrieve diver using umbilical.
   d) Tender shall call for assistance as needed.

6.45.3 Diver Recall

The diver recall shall be used for any situation that requires the immediate
exiting of divers from the water. The tender shall sound the recall. Upon
hearing the recall the diver shall acknowledge the diver recall with 3 pulls on the safety line and surface immediately with an ascent rate not to exceed 1 ft./second.

SECTION 7.00 MEDICAL STANDARDS

7.10 MEDICAL REQUIREMENTS

7.11 General

a) The NATIONAL AQUARIUM 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.

d)

e)

f) )

7.12 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 NATIONAL AQUARIUM has obtained the results of that examination, and those results have been reviewed and found satisfactory by the NATIONAL AQUARIUM.

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.

7.13 Information Provided Examining Physician

The NATIONAL AQUARIUM shall provide a copy of the medical evaluation requirements of this standard to the examining physician.

7.14 Content of Medical Evaluations
Medical examinations conducted initially and at the intervals specified in Section 7.12

**Frequency of Medical Evaluations** shall consist of the following:

a) Applicant agreement for release of medical information to the Diving Safety Officer and the Dive Control Board.

b).  
c) Medical history.

d)

e)

f).

g) Diving physical examination (Required tests listed below and in

h)  
  
i)  
  j).

7.15 **Conditions Which May Disqualify Candidates From Diving**

There are a number of conditions that may disqualify a candidate from diving under the auspices of the NATIONAL AQUARIUM. These conditions are listed in the medical package and evaluated by the examining physician. Disqualification concerns may be brought to the NATIONAL AQUARIUM consulting dive physician upon request.

7.20 **LABORATORY REQUIREMENTS FOR DIVING MEDICAL EVALUATION AND INTERVALS**

a) Initial examination, under age 40:
   1. Medical History
   2. Complete Physical Exam, emphasis on neurological and otological components
   3. Urinalysis
   4. Any further tests deemed necessary by the physician.

b) Periodic re-examination under age 40 (every 5 years):
   1. Medical History
   2. Complete Physical Exam, emphasis on neurological and otological components
   3. Urinalysis
   4. Any further tests deemed necessary by the physician

c) First exam over age 40:
   1. Medical History
   2. Complete Physical Exam, emphasis on neurological and otological components
   3. Detailed assessment of coronary artery disease risk factors using Multiple-Risk-Factor Assessment (age, family history, lipid profile,
blood pressure, diabetic screening, smoking history). Further
cardiac screening may be indicated based on risk factor assessment.

4. Resting EKG
5. Chest X-ray (unless already completed with initial examination)
6. Urinalysis
7. Any further tests deemed necessary by the physician

d) Periodic re-examination over age 40 (every 3 years); over age 60 (every 2
years):
1. Medical History
2. Complete Physical Exam, emphasis on neurological and otological
components
3. Detailed assessment of coronary artery disease risk factors using
Multiple-Risk-Factor Assessment (age, lipid profile, blood pressure,
diabetic screening, smoking history). Further cardiac screening may
be indicated based on risk factor assessment
4. Resting EKG
5. Urinalysis
6. Any further tests deemed necessary by the physician

7.30 PHYSICIAN’S WRITTEN REPORT

a) After any medical examination relating to the individual’s fitness to dive, the
NATIONAL AQUARIUM shall obtain a written report prepared by the
examining physician that contains the examining physician’s opinion of the
individual’s fitness to dive, including any recommended restrictions or
limitations. This will be reviewed by the Dive Safety Officer(S) and any concerns
brought to the Dive Control Board.

b) The NATIONAL AQUARIUM shall make a copy of the physician’s written
report available to the individual.

DEFINITION OF TERMS

Air sharing: Sharing of an air supply between divers
ATA(s): “Atmospheres Absolute”, Total pressure exerted on an object, by a gas or mixture of gases,
at a specific depth or elevation, including normal atmospheric pressure.
Breath-hold Diving: A diving mode in which the diver uses no self-contained or surface-supplied
air or oxygen supply.
Buddy Breathing: Sharing of a single air source between divers.
Buddy Diver: Second member of the dive team.
Buddy System: Two comparably equipped scuba divers in the water in constant communication.
Buoyant Ascent: An ascent made using some form of positive buoyancy.
Burst Pressure: Pressure at which a pressure containment device would fail structurally.
**Certified Diver:** A diver who holds a recognized valid certification from an organizational member or internationally recognized certifying agency.

**Controlled Ascent:** Any one of several kinds of ascents including normal, swimming, and air sharing ascents where the diver(s) maintain control so a pause or stop can be made during the ascent.

**Cylinder:** A pressure vessel for the storage of gases.

** Decompression Chamber:** A pressure vessel for human occupancy. Also called a hyperbaric chamber or decompression chamber.

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

**Dive:** A descent into the water, an underwater diving activity utilizing compressed gas, an ascent, and return to the surface.

**Dive Computer:** A microprocessor based device which computes a diver’s theoretical decompression status, in real time, by using pressure (depth) and time as input to a decompression model, or set of decompression tables, programmed into the device.

**Dive Location:** A surface or vessel from which a diving operation is conducted.

**Dive Site:** Physical location of a diver during a dive.

**Dive Table:** A profile or set of profiles of depth-time relationships for ascent rates and breathing mixtures to be followed after a specific depth-time exposure or exposures.

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

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

**Diver-Carried Reserve Breathing Gas:** A diver-carried independent supply of air or mixed gas (as appropriate) sufficient under standard operating conditions to allow the diver to reach the surface, or another source of breathing gas, or to be reached by another diver.

**Diving Mode:** A type of diving required specific equipment, procedures, and techniques, for example, snorkel, scuba, surface-supplied air, or mixed gas.

**Diving Control Board (DCB):** Group of individuals who act as the official representative of the membership organization in matters concerning the scientific diving program.

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

**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.”

**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.

**First Responder:** Qualified and trained in CPR/First Aid NAI staff member responsible for initial response of a First Aid call.

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

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

**FFW:** Feet or 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 pO2 for a given gas mixture reaches a predetermined maximum.

**MSW:** Meters of seawater or equivalent static head.

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


**No-Decompression limits:** Depth-time limits of the “no-decompression limits and repetitive dive group designations table for no-decompression air dives” of the U.S. Navy Diving Manual or equivalent limits.

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

**Oxygen Clean:** All combustible contaminants have been removed.

**Oxygen Compatible:** A gas delivery system that has components (o-rings, valve seats, diaphragms, etc.) that are compatible with oxygen at a stated pressure and temperature.

**Oxygen Service:** A gas delivery system that is both oxygen clean and oxygen compatible

**Oxygen Toxicity Unit:** - OTU

**Oxygen Toxicity:** Any adverse reaction of the central nervous system (“acute” or “CNS” oxygen toxicity) or lungs (“chronic”, “whole-body”, or “pulmonary” oxygen toxicity) brought on by exposure to an increased (above atmospheric levels) partial pressure of oxygen.

**Pressure-Related Injury:** An injury resulting from pressure disequilibrium within the body as the result of hyperbaric exposure. Examples include: decompression sickness, pneumothorax, mediastinal emphysema, air embolism, subcutaneous emphysema, or ruptured eardrum.

**Pressure Vessel:** - See cylinder.

**pN2:** Inspired partial pressure of nitrogen, usually expressed in units of atmospheres absolute

**pO2:** Inspired partial pressure of oxygen, usually expressed in units of atmospheres absolute

**Psi:** Unit of pressure, “pounds per square inch.

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

**Recompression Chamber:** - see decompression chamber.

**Scientific Diving:** Scientific diving is defined (29CFR1910.402) as diving performed solely as a necessary part of a scientific, research, or educational activity by employees whose sole purpose for diving is to perform scientific research tasks.
**Scuba Diving**: A diving mode independent of surface supply in which the diver uses open circuit self-contained underwater breathing apparatus

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

**Surface Supplied Diving**: 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

Appendix
Appendix i

**AAUS STATISTICS COLLECTION CRITERIA AND DEFINITIONS COLLECTION CRITERIA:**
The "Dive Time in Minutes", The Number of Dives Logged", and the "Number of Divers Logging Dives" will be collected for the following categories.

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

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

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

Dives will not be differentiated as openwater or confined water dives. But openwater and confined water dives will be logged and submitted for AAUS statistics classified as either scientific or training/proficiency.

A "Diver Logging a Dive" is defined as a person who is diving under the auspices of your scientific diving organization. Dives logged by divers from another AAUS Organization will be reported with the diver’s home organization. Only a diver who has actually logged a dive during the reporting period discounted under this category.

**Incident Types** occurring during the collection cycle. Only incidents occurring during, or resulting from, a dive where the diver is breathing a compressed gas will be submitted to AAUS.

**DEFINITIONS:**

**Dive Classification:**

- **Scientific Dives**: Dives that meet the scientific diving exemption as defined in 29 CFR 1910.402.

Diving tasks traditionally associated with a specific scientific discipline are considered a scientific dive. Construction and trouble-shooting tasks traditionally associated with commercial diving are not considered a scientific dive.

- **Training and Proficiency Dives**: Dives performed as part of a scientific diver training program, or dives performed in maintenance of a scientific diving certification/authorization.

**Breathing Gas:**

- **Air**: Dives where the bottom gas used for the dive is air.
- **Nitrox**: Dives where the bottom gas used for the dive is a combination of nitrogen and oxygen other than air.
- **Mixed Gas**: Dives where the bottom gas used for the dive is a combination of oxygen, nitrogen, and helium (or other "exotic" gas), or any other breathing gas combination not classified as air or nitrox.
**Diving Mode:**

**Open Circuit Scuba**: Dives where the breathing gas is inhaled from a self contained underwater breathing apparatus and all of the exhaled gas leaves the breathing loop.

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

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

**Rebreathers**: Dives where the breathing gas is repeatedly recycled in the breathing loop. The breathing loop may be fully closed or semi-closed. Note: A rebreather dive ending in an open circuit bailout is still logged as a rebreather dive.

**Decompression Planning and Calculation Method**:

- Dive Tables
- Dive Computer
- PC Based Decompression Software

**Depth Ranges**:

Depth ranges for sorting logged dives are 0-30, 31-60, 61-100, 101-130, 131-150, 151-190, and 191->. Depths are in feet seawater. A dive is logged to the maximum depth reached during the dive. Note: Only "The Number of Dives Logged" and "The Number of Divers Logging Dives" will be collected for this category.

**Specialized Environments**:

- **Required Decompression**: Any dive where the diver exceeds the no-decompression limit of the decompression planning method being employed.
- **Overhead Environments**: Any dive where the diver does not have direct access to the surface due to a physical obstruction.
- **Blue Water Diving**: Openwater diving where the bottom is generally greater than 200 feet deep and requiring the use of multiple-tethered diving techniques.
- **Ice and Polar Diving**: Any dive conducted under ice or in polar conditions. Note: An Ice Dive would also be classified as an Overhead Environment dive.
- **Saturation Diving**: Excursion dives conducted as part of a saturation mission are to be logged by "classification", "mode", "gas", etc. The "surface" for these excursions is defined as leaving and surfacing within the Habitat. Time spent within the Habitat or chamber shall not be logged by AAUS.
- **Aquarium**: An aquarium is a shallow, confined body of water, which is operated by or under the control of an institution and is used for the purposes of specimen exhibit, education, husbandry, or research. (Not a swimming pool)
Incident Types:

- **Hyperbaric**: Decompression Sickness, AGE, or other barotrauma requiring recompression therapy.
- **Barotrauma**: Barotrauma requiring medical attention from a physician or medical facility, but not requiring recompression therapy.
- **Injury**: Any non-barotrauma injury occurring during a dive that requires medical attention from a physician or medical facility.
- **Illness**: Any illness requiring medical attention that can be attributed to diving.
- **Near Drowning / Hypoxia**: An incident where a person asphyxiates to the minimum point of unconsciousness during a dive involving a compressed gas. But the person recovers.
- **Hyperoxic / Oxygen Toxicity**: An incident that can be attributed to the diver being exposed to too high a partial pressure of oxygen.
- **Hypercapnea**: An incident that can be attributed to the diver being exposed to an excess of carbon dioxide.
- **Fatality**: Any death accruing during a dive or resulting from the diving exposure.
- **Other**: An incident that does not fit one of the listed incident types.

Incident Classification Rating Scale:

- **Minor**: Injuries that the OM considers being minor in nature. Examples of this classification of incident would include, but not be limited to:
  - Mask squeeze that produced discoloration of the eyes.
  - Lacerations requiring medical attention but not involving moderate or severe bleeding.
  - Other injuries that would not be expected to produce long term adverse effects on the diver’s health or diving status.
- **Moderate**: Injuries that the OM considers being moderate in nature. Examples of this classification would include, but not be limited to:
  - DCS symptoms that resolved with the administration of oxygen, hyperbaric treatment given as a precaution.
  - DCS symptoms resolved with the first hyperbaric treatment.
  - Broken bones.
  - Torn ligaments or cartilage.
  - Concussion.
  - Ear barotrauma requiring surgical repair.
- **Serious**: Injuries that the OM considers being serious in nature. Examples of this classification would include, but not be limited to:
  - Arterial Gas Embolism.
  - DCS symptoms requiring multiple hyperbaric treatment.
  - Near drowning.
  - Oxygen Toxicity.
  - Hypercapnea.
  - Spinal injuries.
  - Heart attack.
  - Fatality.
Appendix ii

Emergency Plan for Diving Related Injuries,
National Aquarium in Baltimore

A) Remove diver from the water if necessary.

B) Administer CPR and/or O2 if necessary.

C) Call First Responder.

D) Call Security at 4444. Inform them that a medical problem or emergency exists, its location and nature.

E) Assist EMT and other emergency personnel upon their arrival.

F) The responding EMT will make an assessment of the patient’s condition. If in their opinion, serious injury or illness has occurred.

1. Patient will be transferred via ambulance to:
   University of Maryland Medical Center
   (Shock Trauma)
   Department of Hyperbaric Medicine
   22 South Greene Street
   Baltimore, MD 21201
   24 hour phone #: 410-328-8869
   Chamber phone #: 410-328-6152
   Office phone #: 410-328-6152

2. Program Dive Safety Officer or designee will be notified as soon as possible.
3. Program Dive Safety Officer or designee will be responsible for notifying DAN and program medical advisor.
4. Patient will not be permitted to dive again until cleared by a doctor.
Appendix iii

Emergency Plan for Diving Related Injuries,
National Aquarium in Washington, D.C.

A) Remove diver from the water if necessary.

B) Administer CPR and/or O2 if necessary.

C) Call First Responder.

D) Call 9911. Inform them that a medical problem or emergency exists, its location and nature.

E) Assist EMT and other emergency personnel upon their arrival.

F) The responding EMT will make an assessment of the patient’s condition. If in their opinion, serious injury or illness has occurred.

1. Patient will be transferred via ambulance to:
   George Washington University Hospital
   Department of Emergency Medicine
   Center for Hyperbaric Medicine
   901 23rd Street, NW
   Washington, DC 20032
   24 hour phone #: 202-715-4911
   Chamber phone #: 202-715-4258
   Office phone #: 202-715-4205

2. Program Dive Safety Officer or designee will be notified as soon as possible.
3. Program Dive Safety Officer or designee will be responsible for notifying DAN and program medical advisor.
4. Patient will not be permitted to dive again until cleared by a doctor.
## ON-SITE DIVE PLAN - NATIONAL AQUARIUM

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### FIELD DIVE PLAN - NATIONAL AQUARIUM

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**Purpose:**

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### Dive Equipment:

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### Objectives: (include any notes and or safety concerns):

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Decompression Facility  |  Insert Name  |  Insert #

In the event of an emergency the EMS contact is:  911

Available Transportation:

| Boat from dive site to shore |
| Car on shore |
| Ambulance in case of emergency |

The Dan Emergency Contact Number Is:

1-919-684-4DAN (4326)
Appendix vi

NATIONAL AQUARIUM
STAFF DIVING MEDICAL EVALUATION PACKAGE

PACKAGE CONTENTS:
A) OVERVIEW FOR THE APPLICANT AND APPLICANT INFORMATION
B) MEDICAL & DIVING HISTORY QUESTIONNAIRE (To be completed by Applicant)
C) GUIDELINES FOR EVALUATING THE MEDICAL HISTORY QUESTIONNAIRE
D) OVERVIEW FOR THE PHYSICIAN AND PHYSICIAN INFORMATION
E) DIVING MEDICAL EXAMINATION REPORT (To be completed by Physician)
F) SELECTED REFERENCES IN DIVING MEDICINE
G) RECOMMENDED DIVING MEDICINE PHYSICIANS AND ORGANIZATIONS

A) OVERVIEW AND APPLICANT INFORMATION - To the applicant:
Please read carefully before signing. All parts of this package must be completed prior to entry into the National Aquarium (NAI) Dive Program and periodic re-examination as described in this document and the National Aquarium Dive Safety Manual. Additionally, the tests and procedures outlined in this package are required to be resubmitted if since your last physical exam, you experienced decompression sickness or other barotrauma, unconsciousness, hospitalization, or debilitation. All information submitted is confidential. Diving is an exciting and demanding activity. When performed correctly, applying appropriate techniques, it is very safe. When established safety procedures are not followed, however, there are dangers. Diving can be strenuous under certain conditions. Therefore, your respiratory and circulatory system must be in good health. To dive safely you must not be extremely obese or out of condition. All body air spaces must be normal and healthy. A person with heart trouble, a current cold or congestion, epilepsy, asthma, a severe medical condition, or who is pregnant or under the influence of drugs/alcohol or some medications should not dive. If you have any questions regarding the contents of this package, consult your physician before signing.

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Employer

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Address (Number, Street, City, State, Zip Code)

B) MEDICAL & DIVING HISTORY QUESTIONNAIRE - To the applicant:
Scuba diving makes considerable demands on your physical and emotional condition. Diving with particular defects increases the risk of injury, not only to yourself, but also to your dive partners and/or anyone coming to your aid in the event of an emergency. Therefore, it is necessary to meet certain medical and physical requirements, based on guidelines adapted from the standards of the Recreational SCUBA Training Council (RSTC), before being accepted as a Dive Team Member at the National Aquarium. In preparation for your Diving Medical Examination you will need to complete the following Medical History Questionnaire. This Questionnaire will be used by your physician and the NAI Consulting Physician to determining whether it is safe for you to dive and whether you will be approved (with or without restriction) for diving, and will not be used for other purposes. The answers you provide important background for the Consulting Physician and will assist him or her in determining your fitness, contributing to what your physician may see, hear, or feel when you are examined. Obviously, you should give accurate information or the medical screening procedure becomes useless and could endanger your safety. All questions are answered with a YES or NO. A positive response to a question does not necessarily disqualify you from diving. A positive response means that there is a preexisting condition that may affect your safety while diving and you must seek the advice of a physician. In such instances, a written authorization will be required in order to further consider your application. If your physician concludes you are unfit for diving, remember that their decision is in your best interest. Please respect the advice and the intent of this medical history form.

____________________________________________                  ______________________
Name of Applicant                   Date

**PRESENT STATE OF HEALTH:** □ Excellent  □ Good  □ Fair  □ Poor

**DIVING HISTORY:**
Certification Agency: ___________________________ Highest Certification Level: ___________________________
Initial Certification Date: ___________________________ Date of Last Dive: ___________________________
Number of Logged Dives: ___________________________ Maximum Depth: ___________________________

Advanced, Technical, or Specialty Diving (check all that apply):
□ Cave  □ Wreck  □ Ice  □ Limited Visibility
□ Decompression  □ Saturation  □ Nitrox  □ Mixed Gas
□ Rescue  □ DAN O₂ Provider  □ CPR  □ First Aid
Have you passed an Oxygen Tolerance Test?  □ Yes  □ No

History of Decompression Incidents or other Barotrauma:
Bends: ___________________________ □ Pain only  □ Neurological  □ Inner ear
Embolism: ___________________________
Other: ___________________________
Serious symptoms: ___________________________
Any residuals: ___________________________
**MEDICAL HISTORY:** (Have you ever had or been treated for)

### DIVING RELATED QUESTIONS:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>
| ☐   | ☐  | Gas embolism
| ☐   | ☐  | Oxygen Toxicity
| ☐   | ☐  | CO\textsubscript{2} toxicity
| ☐   | ☐  | Ear squeeze
| ☐   | ☐  | Eardrum rupture
| ☐   | ☐  | Sinus squeeze
| ☐   | ☐  | Deafness
| ☐   | ☐  | Motion sickness
| ☐   | ☐  | Lung squeeze
| ☐   | ☐  | Near drowning
| ☐   | ☐  | Asphyxiation
| ☐   | ☐  | Vertigo
| ☐   | ☐  | Pneumothorax
| ☐   | ☐  | Nitrogen narcosis
| ☐   | ☐  | Loss of consciousness
| ☐   | ☐  | Difficulty equalizing
| ☐   | ☐  | Other diving related problems

### GENERAL QUESTIONS:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>
| ☐   | ☐  | Lung cysts
| ☐   | ☐  | Epilepsy/seizure
| ☐   | ☐  | Heart attack/Angina
| ☐   | ☐  | Uncorrectable Vision
| ☐   | ☐  | Corrected vision
| ☐   | ☐  | Eye trouble
| ☐   | ☐  | Color vision defect
| ☐   | ☐  | Eye surgery
| ☐   | ☐  | Defective hearing
| ☐   | ☐  | Perforated eardrum
| ☐   | ☐  | Ringing of the ears
| ☐   | ☐  | Ear trouble
| ☐   | ☐  | Convulsions
| ☐   | ☐  | Nervous breakdown
| ☐   | ☐  | Head injury
| ☐   | ☐  | Sinus trouble
| ☐   | ☐  | Anxiety spells
| ☐   | ☐  | Hyperventilation
| ☐   | ☐  | Frequent colds, flu, sinusitis, or bronchitis
| ☐   | ☐  | Hernia
| ☐   | ☐  | Colostomy
| ☐   | ☐  | Nose bleed
| ☐   | ☐  | Chest pain
| ☐   | ☐  | High or low blood pressure
| ☐   | ☐  | Pregnant (currently)
| ☐   | ☐  | Pregnant (attempting)
| ☐   | ☐  | Asthma
| ☐   | ☐  | Coughing blood
| ☐   | ☐  | Shortness of breath
| ☐   | ☐  | Chronic cough
| ☐   | ☐  | Appendicitis
| ☐   | ☐  | Stomach trouble
| ☐   | ☐  | Jaundice
| ☐   | ☐  | Liver disease
| ☐   | ☐  | Kidney trouble
| ☐   | ☐  | Blood in urine
| ☐   | ☐  | Hemorrhoids
| ☐   | ☐  | Rheumatism
| ☐   | ☐  | Dislocations
| ☐   | ☐  | Muscles weakness/cramps
| ☐   | ☐  | Shoulder injury
| ☐   | ☐  | Broken bones
| ☐   | ☐  | Swollen ankles
| ☐   | ☐  | Elbow injury
| ☐   | ☐  | Tumor or cancer
| ☐   | ☐  | Blood disease
| ☐   | ☐  | Irregular menses
| ☐   | ☐  | Varicose veins
| ☐   | ☐  | Fainting spells
| ☐   | ☐  | Claustrophobia/Agoraphobia
| ☐   | ☐  | Hay fever
| ☐   | ☐  | Airway obstruction
| ☐   | ☐  | Heart murmur
| ☐   | ☐  | Rheumatic fever/Scarlet fever
| ☐   | ☐  | Disabling headaches
| ☐   | ☐  | Abnormal heart rhythm or EKG
<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Heart trouble</td>
<td>☐ Knee injury</td>
</tr>
<tr>
<td>☐ Tuberculosis</td>
<td>☐ Arthritis</td>
</tr>
<tr>
<td>☐ Lung trouble</td>
<td>☐ Disc problems</td>
</tr>
<tr>
<td>☐ Gallbladder trouble</td>
<td>☐ Foot trouble</td>
</tr>
<tr>
<td>☐ Ulcers</td>
<td>☐ Diabetes</td>
</tr>
<tr>
<td>☐ Rupture</td>
<td>☐ Thyroid/Goiter</td>
</tr>
<tr>
<td>☐ Protein/sugar in urine</td>
<td>☐ Anemia, all types</td>
</tr>
<tr>
<td>☐ Rectal bleeding</td>
<td>☐ Painful menses</td>
</tr>
<tr>
<td>☐ Back pains</td>
<td>☐ Skin rash</td>
</tr>
<tr>
<td>☐ Paralysis</td>
<td>☐ Panic easily</td>
</tr>
</tbody>
</table>

**Explanation of any items checked Yes:**

**List (with date) all surgeries, serious illness, or injuries:**

**Please answer the following questions (every item checked Yes must be fully explained in the space provided):**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Are you unable to perform moderate exercise?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Do you have any conditions that may require special work assignment?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Do you have any difficulties in water or while swimming?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Have you ever been rejected or rated for insurance, employment, or armed forces for health insurance?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Have you had significant exposure to mining dust, asbestos, silica, or toxic chemicals?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Have you ever had ill effects from any work that you have done?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Are you taking any type of medications including patent medications?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Have you been advised to have a surgical operation or medical treatment that has not been done?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Do you consume alcoholic beverages?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Do you heavily consume alcoholic beverages?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Do you smoke?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Do you smoke heavily?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Do you presently use marijuana, LSD, narcotics or controlled substances?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Do you have a history of drug or alcohol abuse?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Do you have any allergies or reactions to food, chemicals, drugs, insect stings, or marine life?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Do you have any medical problems not listed?</td>
<td>☐</td>
</tr>
<tr>
<td>☐ Are you presently under the care of a physician? If yes, give name of physician in space provided below.</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Comments:**
Name and address of personal physician:

________________________________________________________________________

Date of last physical examination: __________________________
Company or organization for which you were examined:
________________________________________________________________________

Name and address of physician who performed you last exam:
________________________________________________________________________

Since your last physical exam, have you experienced decompression sickness, other barotrauma, unconsciousness, hospitalization, or debilitation? If Yes, explain:
________________________________________________________________________

Date of last Tetanus Immunization: __________________________
Have you ever had any of the following? If so, give approximate dates.

☐ Chest x-ray ________________________  ☐ Pulmonary function study_________
☐ Audiogram _________________________
☐ EKG___________________________

Physician’s remarks:
________________________________________________________________________

APPLICANT'S RELEASE OF MEDICAL INFORMATION AND STATEMENT OF ACCURACY:

I certify that I have reviewed the foregoing information supplied by me and that it is true and complete to the best of my knowledge. I understand that omitting or misrepresenting facts called for above may be dangerous to my health and/or cause for refusal to or dismissal from the NAI Dive Program. I authorize any of the doctors, hospitals, or clinics mentioned above to furnish the NAI or its designee a complete transcript of my medical records for the purpose of processing my physical examination. Furthermore, I authorize the release of the information recorded in this package and all medical information subsequently acquired in association with my diving to, the National Aquarium Dive Safety Office and Dive Control Board.

Applicant Signature ___________________________________________ Date

Witness Signature ___________________________________________ Date
GUIDELINES FOR EVALUATING THE MEDICAL HISTORY QUESTIONNAIRE - To the Physician:

The following guidelines are adapted from the standards of the Recreational SCUBA Training Council (RSTC). Recreational SCUBA (Self Contained Underwater Breathing Apparatus) diving has an excellent safety record. To maintain this status it is important to screen student divers for physical deficiencies that could place them in peril in the underwater environment. This questionnaire and subsequent medical evaluation is designed to detect conditions that put a diver at increased risk for decompression sickness, pulmonary overinflation syndrome with subsequent cerebral gas embolization and loss of consciousness that could lead to drowning. Additionally, the diver must be able to withstand some degree of cold stress, cope with the optical effects of water and have a reserve of physical and mental abilities to deal with possible emergencies. The history, review of systems and physical examination should include, as a minimum, the points listed below. The list of contraindications, relative and absolute, is not all inclusive. It contains the most commonly encountered medical problems only. The brief introductions should serve to alert the physician to the nature of medical problems that put the diver at risk, and (lead him) to consider the individual patient’s state of health. Diagnostic studies and specialty consultations should be obtained as indicated to satisfy the physician as to the diver’s status. A list of references is included to aid in clarifying issues that arise. The National Aquarium is a sponsor of the Divers Alert Network (DAN) and highly recommends their advice. DAN can be reached for consultation by phone at (919) 684-2948 (x-222) during normal business hours and for emergency calls, 24 hours, 7 days a week, call (919) 684-8111. Some conditions are absolute contra-indications to scuba diving. Conditions that are absolute contraindications place the diver at increased risk for injury or death. Others are relative contraindications to scuba that may be resolved with time and proper medical intervention. Ultimately the physician should decide with the individual, based on his knowledge of the patient’s medical status, whether the individual is physically qualified to participate in scuba diving.

CARDIOVASCULAR SYSTEMS:
Relative Contraindications: The diagnoses listed below potentially render the diver unable to meet the exertional performance requirements likely to be encountered in recreational diving. The diagnoses listed may lead the diver to experience cardiac ischemia and its consequences. Formalized stress testing is encouraged if there is any doubt regarding physical performance capability. The suggested minimum criterion for stress testing in such cases is 13 METS. Failure to meet the exercise criteria is disqualifying. Conditioning and retesting may make later qualification possible.
- History of CABG or PCTA for CAD
- History of myocardial infarction
- Uncontrolled Hypertension
- History of dysrhythmias requiring medication for suppression
- Valvular regurgitation
- Symptomatic mitral valve prolapse
- Pacemakers – The pathologic process that necessitated pacing should be addressed regarding the fitness to dive. Finally in those instances where the problem necessitating pacing does not preclude diving, will the diver be able to meet the performance criteria?

Note: Pacemakers must be certified by the manufacturer as able to withstand the pressure changes involved in recreational diving (to depths of 130 feet of sea water).

Absolute Contraindications: Venous gas emboli produced during decompression may cross intracardiac shunts and enter the cerebral circulation with potentially catastrophic results. Symmetric septal hypertrophy and valvular stenosis may lead to the sudden onset of unconsciousness during exercise.
- Congestive heart failure
PULMONARY:
Any process or lesion that impedes airflow from the lung places the diver at risk for pulmonary overinflation with alveolar rupture and the possibility of cerebral air embolization. Asthma (reactive airway disease), COPD cystic or cavitating lung diseases all may lead to air trapping. Spirometry, provocative tests such as methacholine challenge and other studies to detect air trapping should be carried out to establish to the examining physician’s satisfaction that the diver is not at risk. A pneumothorax that occurs or recurs while diving is catastrophic. As the diver ascends, air trapped in the cavity expands rapidly producing a tension pneumothorax.

Relative Contraindications:
- History of prior asthma or reactive airway disease (RAD)*
- History of exercise/cold induced bronchospasm (EIB)*
- History of solid, cystic of cavitating lesion*
- Pneumothorax secondary to: thoracic surgery, trauma or pleural penetration,*
- previous overinflation injury*
- Restrictive Disease**
  (*Air Trapping must be excluded)  (**Exercise Testing necessary)

Absolute Contraindications:
- Active RAD (asthma), EIB, COPD or history of the same with abnormal PFT’s or positive challenge
- Restrictive diseases with exercise impairment
- History of spontaneous pneumothorax

NEUROLOGICAL:
Neurological abnormalities that affect a diver’s ability to perform exercise should be assessed individually based on the degree of compromise involved.

Relative Contraindications:
- Migraine headaches whose symptoms or severity impair motor or cognitive function
- History of head injury with sequelae other than seizure
- Herniated nucleus pulposus
- Peripheral neuropathy
- Trigeminal neuralgia
- History of spinal cord or brain injury without residual neurological deficit
- History of cerebral gas embolism without residual pulmonary air trapping has been excluded
- Cerebral palsy in the absence of seizure activity

Absolute Contraindications: Abnormalities where the level of consciousness is subject to impairment put the diver at increased risk of drowning. Divers with spinal cord or brain abnormalities where perfusion is impaired are at increased risk of spinal cord or cerebral decompression sickness.
- History of seizures other than childhood febrile seizures
- Intracranial tumor or aneurysm
- History of TIA or CVA

OTOLARYNGOLOGICAL:
Equalization of pressure must take place during ascent and descent between ambient water pressure and the external auditory canal, middle ear and paranasal sinuses. Failure of this to occur results at least in pain and in the worst case rupture of the occluded space with disabling and possible lethal consequences. The inner ear is fluid filled and therefore noncompressible.
The flexible interfaces between the middle and inner ear, the round and oval windows, are however subject to pressure changes. Previously ruptured but healed round or oval window membranes are at increased risk of rupture due to failure to equalize pressure or due to marked over pressurization during vigorous or explosive Valsalva maneuvers. The larynx and pharynx must be free of an obstruction to airflow. The laryngeal and epiglottic structure must function normally to prevent aspiration. Mandibular and maxillary function must be capable of allowing the patient to hold a scuba mouthpiece. Individuals who have had mid-face fractures may be prone to barotrauma and rupture of the air filled cavities involved.

**Relative Contraindications:**
- Recurrent otitis externa
- Significant obstruction of external auditory canal
- History of significant cold injury to pinna
- Eustachian tube dysfunction
- Recurrent otitis media or sinusitis
- History of TM perforation
- History of tympanoplasty
- History of mastoidectomy
- Significant conductive or sensorineural hearing impairment
- Facial nerve paralysis not associated with barotrauma
- Full prostheticonic devices
- History of mid-face fracture
- Unhealed oral surgery sites
- Healed Tracheostomy
- History of head and/or neck therapeutic radiation
- History of temperomandibular joint dysfunction

**Absolute Contraindications:**
- Monomeric TM
- Open TM perforation
- Tube myringotomy
- History of stapedectomy
- History of ossicular chain surgery
- History of inner ear surgery
- History of round window rupture
- Facial nerve paralysis secondary to barotrauma
- Inner ear disease other than presbycusis
- Uncorrected upper airway obstruction
- Laryngectomy or status post partial laryngectomy
- Uncorrected laryngocele
- History of vestibular decompression sickness

**GASTROINTESTINAL:**

**Relative Contraindications:** As with other organ systems and disease states, a process that debilitates the diver chronically may impair exercise performance. Additionally diving activity may take place in areas remote from medical care. The possibility of acute recurrences of disability or lethal symptoms must be considered.
- Peptic ulcer disease
- Inflammatory bowel disease
- Malabsorption states
- Functional bowel disorders
- Post gastrectomy dumping syndrome
- Paraesophageal or hiatal hernia

| 73 |
**Absolute Contraindications:** Altered anatomical relationships secondary to surgery or malformations that lead to gas trapping may cause serious problems. Gas trapped in a hollow viscus expands as the diver surfaces and can lead to rupture or in the case of the upper GI tract, emesis. Emesis underwater may lead to drowning.

- High grade gastric outlet obstruction
- Chronic or recurrent small bowel obstruction
- Entero-cutaneous fistulae that do not drain freely
- Esophageal diverticula
- Severe gastroesophageal reflux
- Achalasia
- Unrepaired hernias of the abdominal wall potentially containing bowel

**METABOLIC AND ENDOCRINOLOGICAL:**
States of altered hormonal or metabolic function should be assessed according to their impact on the individual’s ability to tolerate the moderate exercise requirement and environmental stress of sport diving. Generally divers with altered hormonal status should be in as near an optimal physiologic state as is possible. It should be noted that obesity predisposes the individual to decompression sickness and is an indicator of poor overall physical fitness.

- Hormonal excess or deficiency
- Obesity
- Renal insufficiency
- Reliably Controlled Diabetic

**PREGNANCY:**
Venous gas emboli formed during decompression may result in fetal malformations. **Diving is absolutely contraindicated during any stage of pregnancy.**

**HEMATOLOGICAL:**
Abnormalities resulting in altered rheological properties may increase the risk of decompression sickness.

**Relative Contraindications:**
- Sickle cell trait
- Acute anemia

**Absolute Contraindications:**
- Sickle cell disease
- Polycythemia
- Leukemia

**ORTHOPEDIC:**
Relative impairment of mobility particularly in the small boat environment or ashore with equipment weighing up to 40 pounds must be assessed. The impact of exercise ability is also an important consideration.

**Relative Contraindications:**
- Chronic back pain
- Amputation
- Scoliosis – must also assess impact on pulmonary function
- Aseptic necrosis – possible risk of progression related to adequacy of decompression
BEHAVIORAL HEALTH:
The diver’s mental capacity and emotional makeup are important to safe diving. The student diver must have sufficient learning abilities to grasp information presented to him by his instructors, be able to safely plan and execute his own dives and react to changes about him in the underwater environment. The student’s motivation to learn scuba and his ability to deal with potentially dangerous situations is also crucial to safe diving.

**Relative Contraindications:**
- Developmental delay
- History of drug or alcohol abuse
- History of previous psychotic episodes
- Claustrophobia
- Receiving psychotropic medications

**Absolute Contraindications:**
- Inappropriate motivation to dive – solely to please spouse or partner, to prove oneself in the face of personal fears
- Agoraphobia
- Active psychosis
- History of panic disorder
- Drug or alcohol abuse

D) **OVERVIEW FOR THE PHYSICIAN AND PHYSICIAN INFORMATION - To the Physician:**

Please read carefully before signing. Upon receipt, this package will be reviewed by the NAI Consulting Physician. The applicant listed in Section A of this package requires a medical examination to assess their fitness to function as a Dive Team Member at the National Aquarium Institute. If accepted, the applicant will be performing as many as six 45 minute dives per day, once every other week, in various Aquarium exhibits. The maximum depth in these exhibits is less than 25 feet and the purpose of these dives would be to perform public presentations, routine maintenance, and hand feeding of animals. The applicant’s answers on the Medical History Questionnaire (Section B) may indicate potential health or safety risks. Your evaluation is requested on this questionnaire as well as on the Diving Medical Examination Report (Section E). To assist you in this evaluation, a set of guidelines has been provided (Section C). Please contact the personnel listed below if you have any questions or concerns about diving medicine or the National Aquarium Institute standards. If you have additional questions about diving medicine, you may wish to consult one of the references provided (Section F), or contact one of the Diving Medicine Physicians or Organizations (Section G). Thank you for your assistance and please feel free to comment in regard to our recommendations and the format of this package.

Clifford E. Boehm, MD, RRT
Diving & Hyperbaric Medicine
Chief, Department of Anesthesia
Northwest Hospital
5401 Old Court Road
Randallstown, MD 21133-5185
p 410-701-4547 f 410-701-4342
Holly Martel Bourbon – Dive Safety Officer
National Aquarium, Baltimore, MD
(410) 576-3810
Leah Neal – Assistant Dive Safety Officer
National Aquarium, Baltimore, MD
(410) 659-4288
E) DIVING MEDICAL EXAMINATION REPORT - To the Physician:
The applicant listed below and in Section A of this package is presently certified to engage in
diving activities using Self Contained Underwater Breathing Apparatus (SCUBA). This is an
activity which puts unusual stress on the individual in several ways. Your opinion on the
applicant's medical fitness is requested. Scuba diving requires heavy exertion. The diver must
be free of cardiovascular and respiratory disease. An absolute requirement is the ability of
the lungs, middle ear, and sinuses to equalize pressure. Any condition that risks the loss of
consciousness should disqualify the applicant. The information and tests requested for this
report, as well as the other sections in this package, are designed to meet or exceed
requirements outlined by national standards. Sources of additional information regarding
these standards are provided in this package (Section F). To assist you in this evaluation, a
set of guidelines has also been provided (Section D) and a list of Diving Medicine Physicians
and Organizations (Section G).

______________________________                ______________________
Name of Applicant                                      Date

REQUIRED TESTS for Initial Examination - Please initial that the following tests were
completed upon:

□ Initial Examination

_____Medical History Review w/ detailed
assessment of coronary artery disease using
Multiple-Risk-Factor Assessment -               _____Audiogram - REQUIRED

_____Physical Exam w/ Visual acuity and
Color Test – REQUIRED

_____Urinalysis – REQUIRED
_____Resting EKG (12 lead) – **REQUIRED** (over age 40)

_____Chest X-Ray (CRX) – **REQUIRED** (over age 40 – unless completed with initial examination)

☐ Re-examination (Reason :______________________)

_____Medical History Review w/ detailed assessment of coronary artery disease using Multiple-Risk-Factor Assessment - **REQUIRED**

_____Physical Exam w/ Visual acuity and Color Test - **REQUIRED**

_____EKG (12 Lead) **REQUIRED** (over age 40)

_____Audiogram – **REQUIRED** (over age 40)

_____Urinalysis - **REQUIRED**

_____Other tests as needed
PHYSICIAN RECOMMENDATION:

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

☐ RESTRICTED ACTIVITY APPROVAL -
   The applicant may dive in certain circumstances. See REMARKS.

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

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

REMARKS: _______________________________________________________________

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

________________________________________________________________________

_____________________________ M.D. _____________________
Signature Date

________________________________________________________________________

Physician’s Name (For detailed Physician Information – See Section B)

My familiarity with applicant is:

☐ With this exam only

☐ Regular Physician for _____ years

☐ Other: _______________________________________________________________

________________________________________________________________________

F) SELECTED REFERENCES IN DIVING MEDICINE


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


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

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


G) RECOMMENDED DIVING MEDICINE PHYSICIANS AND ORGANIZATIONS

The following is a list of Physicians and Organizations with expertise in Diving Medicine. The examining physician or applicant may wish to consult one of the following if there are questions regarding this examination package. These are only recommendations. The National Aquarium in Baltimore does not require the consultation of any or all of the following. The applicant is encouraged to make their own decision in regard to selection of their examining physician.

Clifford E. Boehm, MD, RRT
Diving & Hyperbaric Medicine
Chief, Department of Anesthesia
Northwest Hospital
5401 Old Court Road
Randallstown, MD 21133-5185
p 410-701-4547 f 410-701-4342
Jonathan Titus, MD
Alfred Kirkwood, DO
Eric Desman, MD
Dan Valaik, MD
Inova Health Systems
Alexandria, VA
(703) 664-7218

Stephen Thom, MD, PHD
Kevin Hardy, MD
Christopher Logue, MD
University of Pennsylvania Health System
1-800-789-7366

Divers Alert Network (DAN)
Durham, NC
(919) 684-2948 (x-222)

Recreational Scuba Training Council (RSTC)
(813) 996-6582

Professional Association of Diving Instructors (PADI)
(714) 540-7234

National Association of Underwater Instructors (NAUI)
Appendix vii
OVERVIEW AND APPLICANT INFORMATION:

Please read carefully before signing - All parts of this document must be completed prior to diving under the auspices of the National Aquarium Dive Program. Additionally, all information submitted is confidential. Diving is an exciting and demanding activity and when performed correctly, applying appropriate techniques, it is very safe. When established safety procedures are not followed, however, there are dangers. Since diving can be strenuous under certain conditions, your respiratory and circulatory system must be in good health. To dive safely you must not be extremely obese or out of condition. All body air spaces must be normal and healthy. A person with heart trouble, a current cold or congestion, epilepsy, asthma, a severe medical condition, or who is pregnant or under the influence of drugs/alcohol or some medications should not dive. If you have any questions regarding the contents of this document, consult your physician before signing.

<table>
<thead>
<tr>
<th>Applicant: Last Name</th>
<th>First Name</th>
<th>Middle Name</th>
<th>Sex</th>
</tr>
</thead>
</table>

Address (Number, Street, City, State, Zip Code)

Date of Birth          Social Security Number          Home Phone Number

Employer                   Work Phone Number

Next of Kin (Name and Relationship) Home Phone Number

Address (Number, Street, City, State, Zip Code)

MEDICAL & DIVING HISTORY QUESTIONNAIRE:

Scuba diving makes considerable demands on your physical and emotional condition. Diving with particular defects increases the risk of injury, not only to yourself, but also to your dive partners and/or anyone coming to your aid in the event of an emergency. Therefore, it is necessary to meet certain medical and physical requirements before being accepted as a Dive Team Member at the National Aquarium. In preparation for this you will need to complete the following Medical & Diving History Questionnaire. The answers you provide are in many ways more important in determining your fitness than what a physician may see, hear, or feel during an examination. Obviously, you should give accurate information or the medical screening procedure becomes useless. All questions are answered with a YES or NO. A positive response to a question does not
necessarily disqualify you from diving. A positive response means that further evaluation may be necessary. If it is concluded that you are unfit for diving at this time, remember that the decision is in your best interest. Please respect the advice and the intent of this medical history form.

**DIVING HISTORY:**

<table>
<thead>
<tr>
<th>Certification Agency:</th>
<th>Highest Cert. Level:</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Initial Certification Date:</th>
<th>Date of Last Dive:</th>
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</table>

<table>
<thead>
<tr>
<th>Number of Logged Dives:</th>
<th>Maximum Depth:</th>
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</tbody>
</table>

**Advanced, Technical, or Specialty Diving (check all that apply):**

- [ ] Cave
- [ ] Wreck
- [ ] Ice
- [ ] Limited Visibility
- [ ] Decompression
- [ ] Saturation
- [ ] Nitrox
- [ ] Mixed Gas
- [ ] Rescue
- [ ] DAN O₂ Provider
- [ ] CPR
- [ ] First Aid
- [ ] First Aid for Professional Diver course

Have you passed an Oxygen Tolerance Test?  [ ] Yes  [ ] No

**History of Decompression Incidents or other Barotrauma:**

- Bends: ____________________________  [ ] Pain only  [ ] Neurological  [ ] Inner ear
- Embolism: ____________________________
- Other: ________________________________

**Present State of Health:**

- [ ] Excellent
- [ ] Good
- [ ] Fair
- [ ] Poor
**MEDICAL HISTORY:** (Have you ever had or been treated for)

**DIVING RELATED QUESTIONS:**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
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<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
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<td>☐</td>
<td></td>
<td>Gas embolism</td>
<td>☐</td>
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<td>☐</td>
<td></td>
<td>Oxygen Toxicity</td>
<td>☐</td>
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<td>☐</td>
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<td>CO₂ toxicity</td>
<td>☐</td>
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<td>☐</td>
<td></td>
<td>CO toxicity</td>
<td>☐</td>
<td></td>
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<tr>
<td>☐</td>
<td></td>
<td>Ear squeeze</td>
<td>☐</td>
<td></td>
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<tr>
<td>☐</td>
<td></td>
<td>Eardrum rupture</td>
<td>☐</td>
<td></td>
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<tr>
<td>☐</td>
<td></td>
<td>Sinus squeeze</td>
<td>☐</td>
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<td>☐</td>
<td></td>
<td>Deafness</td>
<td>☐</td>
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<tr>
<td>☐</td>
<td></td>
<td>Motion sickness</td>
<td>☐</td>
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**MEDICAL QUESTIONS:**

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<th>Yes</th>
<th>No</th>
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<td>☐</td>
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<td>Lung cysts</td>
<td>☐</td>
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<td>☐</td>
<td></td>
<td>Epilepsy/seizure</td>
<td>☐</td>
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<td>☐</td>
<td></td>
<td>Heart attack/Angina</td>
<td>☐</td>
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<tr>
<td>☐</td>
<td></td>
<td>Uncorrectable Vision</td>
<td>☐</td>
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<tr>
<td>☐</td>
<td></td>
<td>Corrected vision</td>
<td>☐</td>
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<tr>
<td>☐</td>
<td></td>
<td>Eye trouble</td>
<td>☐</td>
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<td>☐</td>
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<td>Color vision defect</td>
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<td>Eye surgery</td>
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<td>☐</td>
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<td>Defective hearing</td>
<td>☐</td>
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<td>☐</td>
<td></td>
<td>Perforated eardrum</td>
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<td>☐</td>
<td></td>
<td>Ringing of the ears</td>
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<td>Ear trouble</td>
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<td></td>
<td>Convulsions</td>
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<td>Nervous breakdown</td>
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<td>Anxiety spells</td>
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<td>☐</td>
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<td>Hyperventilation</td>
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<td>☐</td>
<td></td>
<td>Frequent colds, flu, sinusitis, or bronchitis</td>
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<td>☐</td>
<td></td>
<td>Hernia</td>
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<td>☐</td>
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<td>Colostomy</td>
<td>☐</td>
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<td>☐</td>
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<td>Nose bleed</td>
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<td>Chest pain</td>
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<td>☐</td>
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<td>High or low blood pressure</td>
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<td>Pregnant (currently)</td>
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<td>Pregnant (attempting)</td>
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<td>Asthma</td>
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<td>☐</td>
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<td>Coughing blood</td>
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<td>Shortness of breath</td>
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<tr>
<td>Condition</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Gallbladder trouble</td>
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<tr>
<td>Protein/sugar in urine</td>
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<td>Rectal bleeding</td>
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<td>Back pains</td>
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<tr>
<td>Paralysis</td>
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<td>Knee injury</td>
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<tr>
<td>Arthritis</td>
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<tr>
<td>Disc problems</td>
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<tr>
<td>Foot trouble</td>
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<tr>
<td>Chronic cough</td>
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</table>

**GENERAL QUESTIONS:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>Do you have any physical defects or any partial disabilities?</td>
<td></td>
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<tr>
<td>Are you unable to perform moderate exercise?</td>
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<tr>
<td>Do you have any conditions that may require special work assignment?</td>
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<tr>
<td>Do you have any difficulties in water or while swimming?</td>
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<tr>
<td>Have you ever been rejected or rated for insurance, employment, or armed forces for health insurance?</td>
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<tr>
<td>Have you had significant exposure to mining dust, asbestos, silica, or toxic chemicals?</td>
<td></td>
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<tr>
<td>Have you ever had ill effects from any work that you have done?</td>
<td></td>
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<tr>
<td>Are you taking any type of medications including patent medications?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you been advised to have a surgical operation or medical treatment that has not been done?</td>
<td></td>
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</tr>
<tr>
<td>Have you ever resigned, been terminated, or changed jobs for medical reasons?</td>
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<td></td>
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<tr>
<td>Do you consume alcoholic beverages?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you heavily consume alcoholic beverages?</td>
<td></td>
<td></td>
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<tr>
<td>Do you smoke?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you smoke heavily?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you presently use marijuana, LSD, narcotics or controlled substances?</td>
<td></td>
<td></td>
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<tr>
<td>Do you have a history of drug or alcohol abuse?</td>
<td></td>
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<tr>
<td>Do you have any allergies or reactions to food, chemicals, drugs, insect stings, or marine life?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have any medical problems not listed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you presently under the care of a physician? If yes, give name of physician in space provided below.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Explanation of any items checked Yes:**

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

List other surgeries, serious illness, or injuries:
Name and address of personal physician:

Date of last physical examination: ________________________________

Since your last physical exam, have you experienced decompression sickness, other barotrauma, unconsciousness, hospitalization, or debilitation? If Yes, explain:

______________________________________________________________

APPLICANT'S RELEASE OF MEDICAL INFORMATION AND STATEMENT OF UNDERSTANDING AND ACCURACY:

I certify that I have thoroughly read this entire document and fully understand all within. Furthermore, I certify that the information supplied by me is true and complete to the best of my knowledge. I understand that omitting or misrepresenting facts called for above may be dangerous to my health and/or cause for refusal to or dismissal from participation in the National Aquarium Dive Program. I authorize any of the doctors, hospitals, or clinics mentioned above to furnish the National Aquarium or its designee a complete transcript of my medical records for the purpose of processing this document. Furthermore, I authorize the release of the information recorded in this document and all medical information subsequently acquired in association with my diving to, the National Aquarium Dive Safety Office and Dive Control Board.

Applicant Signature           Date

Witness Signature             Date

Physician Signature (if applicable)   Date

Dive Safety Officer (DSO) Approval:

Signature                         Date
Appendix viii

## Diving Injury Report

<table>
<thead>
<tr>
<th>Name:</th>
<th>Date and Time of Injury:</th>
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</thead>
<tbody>
<tr>
<td>Age:</td>
<td>Sex:</td>
</tr>
<tr>
<td>Dive Location:</td>
<td>Certification Level:</td>
</tr>
<tr>
<td>Diver’s Agency or Organization:</td>
<td>Current Level (within organization):</td>
</tr>
<tr>
<td>Divemaster or Tender:</td>
<td>Employee/Volunteer/Guest (circle one)</td>
</tr>
<tr>
<td>Depth of Dive:</td>
<td>Bottom Time:</td>
</tr>
<tr>
<td>Number of Dive/24 hours:</td>
<td>Pressure Group Letter (if repetitive dive):</td>
</tr>
<tr>
<td>Last Dive Physical Date:</td>
<td>NAI Equipment used?: Yes No</td>
</tr>
<tr>
<td>Personal Equipment Used?: Yes No</td>
<td>Rental Equipment Used?: Yes No</td>
</tr>
<tr>
<td>Familiarity with Equipment:</td>
<td></td>
</tr>
</tbody>
</table>

### Description of Accident:

- [ ]
- [ ]
- [ ]
- [ ]
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- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

<table>
<thead>
<tr>
<th>DAN Notified:</th>
<th>Date and Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSO Notified:</td>
<td>Date and Time:</td>
</tr>
<tr>
<td>DCB Notified:</td>
<td>Date and Time:</td>
</tr>
</tbody>
</table>

Prepared By: ___________________________  Signature: ___________________________  Date/Time: ___________________________
Appendix ix

Request for Nitrox

*This form must be submitted in conjunction with a completed Field Diving Plan.
*Any diver requesting the ability to use Nitrox must be diving with at least one other NATIONAL AQUARIUM diver with a recreational Nitrox certification.

<table>
<thead>
<tr>
<th>Location:</th>
<th>Number of Dives:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Depth:</td>
<td>Estimated Average Bottom Time:</td>
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</table>

<table>
<thead>
<tr>
<th>Lead Diver:</th>
<th>Nitrox Certification Agency and Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # of Nitrox Dives:</td>
<td>Date of Last Nitrox Dive:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Staff Diver 1:</th>
<th>Nitrox Certification Agency and Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # of Nitrox Dives:</td>
<td>Date of Last Nitrox Dive:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Staff Diver 2:</th>
<th>Nitrox Certification Agency and Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # of Nitrox Dives:</td>
<td>Date of Last Nitrox Dive:</td>
</tr>
</tbody>
</table>

Please use the following space to explain in detail the objectives of the planned trip and how Nitrox will be an integral part of meeting these objectives:

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The Recreational Dive Planner is designed specifically for planning recreational (no decompression) dives on air only. Do not attempt to use it for planning decompression dives.

**Safety Stops** — A safety stop for 3 minutes at 100’ is required any time the dive comes up to or within 3 pressure groups of a no decompression limit and for any dive to a depth of 100’ or deeper.

**Emergency Decompression** — If a no decompression limit is exceeded by no more than 5 minutes, an 8 minute decompression stop at 100’ is mandatory. Upon surfacing, the diver must remain out of the water for at least 6 hours prior to making another dive. If a no decompression limit is exceeded by more than 5 minutes, a 100’ decompression stop of no less than 15 minutes is urged (air supply permitting). Upon surfacing, the diver must remain out of the water for at least 24 hours prior to making another dive.

**Flying After Diving Recommendations**
- For Dives Below 100’: A minimum pre-flight surface interval of 12 hours is suggested.
- For Dives Requiring Decompression Stops:
  - A minimum pre-flight surface interval greater than 18 hours is suggested.

**Diving at Altitude** — Diving at altitude (1000ft or higher) requires the use of specialty diving equipment.

**Special Rules for Multiple Dives**
- If you are planning 3 or more dives in a day: Beginning with the first dive, if your ending pressure group after any dive is W or X, the minimum surface interval between all subsequent dives is 1 hour. If your ending pressure group after any dive is Y or Z, the minimum surface interval between all subsequent dives is 3 hours.

**Note:** Since little is presently known about the physiological effects of multiple dives over multiple days, divers are wise to make fewer dives and limit their exposure toward the end of a multi-day dive schedule.

**CAUTION:** This product for use only by certified divers or individuals under the supervision of a certified scuba instructor. Misuse of this product may result in serious injury or death. If you are unsure as to how to properly use this product, consult a certified scuba instructor.
Appendix xi

### Personal Gear Checklist (for DSO use only)

- The DSO must look over all equipment at least 2 weeks prior to dates being used. Any malfunctions must be remedied and reviewed again before use.
- The diver must also provide to the DSO proof of servicing within 12 months for regulators. This proof also needs to be kept on file in the diver’s record.

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<tr>
<th>Item</th>
<th>Approved Y/N</th>
<th>Comments</th>
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<tr>
<td>Regulator</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Serial Number:</td>
<td></td>
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<tr>
<td>BCD</td>
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<tr>
<td>Mask</td>
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<tr>
<td>Fins</td>
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<tr>
<td>Snorkel</td>
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<tr>
<td>Weight Belt</td>
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<table>
<thead>
<tr>
<th>Diver Name:</th>
<th>Date:</th>
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<table>
<thead>
<tr>
<th>Location of Field Diving:</th>
<th>Dates of Field Diving:</th>
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</table>
Appendix xii

Request for Diving Reciprocity Form

- This form is to be completed by the home Diving Safety officer (DSO) and sent at least a week prior to the requested dive date(s) to the host DSO(s) where diving privileges are requested.

- Final authorization to dive is always given by the host DSO, regardless of experience, training or completed reciprocity checklist of visiting diver(s).

- Host DSOs will attempt to give as much prior notice as possible regarding the approval/denial of the requested visiting diver to the home DSO after receiving the completed Reciprocity Checklist.

- The visiting diver(s) must comply with all diving regulations of the host organization

<table>
<thead>
<tr>
<th>Name of Diver:</th>
<th>Date:</th>
</tr>
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<tbody>
<tr>
<td>Work Telephone#:</td>
<td>Email:</td>
</tr>
<tr>
<td>Address:</td>
<td></td>
</tr>
<tr>
<td>Name of Emergency Contact:</td>
<td></td>
</tr>
<tr>
<td>Name:</td>
<td>Relationship:</td>
</tr>
<tr>
<td>Telephone (work):</td>
<td>Telephone (home):</td>
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<tr>
<td>Address:</td>
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</tr>
</tbody>
</table>

Is the home organization an ADPA member: Yes  No
Is the home organization an AAUS/CAUS member: Yes  No
What are your organizations requirements to dive within your institution (i.e. # of dives, written exams, etc.)

For the following, please record the date of the examination, certification, or activity:
<table>
<thead>
<tr>
<th>Highest Certification Level/Agency*</th>
<th>Date Received:</th>
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<tbody>
<tr>
<td>Date of last dive:</td>
<td># of dives within last 12 months:</td>
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<tr>
<td>Date of most recent check-out dive:</td>
<td>Dive Rescue Training: Yes No</td>
</tr>
<tr>
<td>Experience with diving conditions in visiting aquarium (i.e. cold, tropical, drysuit, etc.):</td>
<td>Reason for Dive (circle one): Courtesy VIP Research Other:</td>
</tr>
<tr>
<td>Date of Diving Physical:</td>
<td>Any restrictions? (if yes, explain):</td>
</tr>
<tr>
<td>Does it meet AAUS standards?: Yes No</td>
<td>If no please explain variances:</td>
</tr>
<tr>
<td>CPR (Agency) Training &amp; Date:</td>
<td>O: Administration (Agency) &amp; Date:</td>
</tr>
<tr>
<td>First Aid Training (Agency) &amp; Date:</td>
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</table>

*Please attach copy of highest certification level card

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

<table>
<thead>
<tr>
<th>Name of Organizational Member Institution:</th>
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</thead>
<tbody>
<tr>
<td>Diving Safety Officer:</td>
</tr>
<tr>
<td>Telephone:</td>
</tr>
<tr>
<td>E-mail:</td>
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__________________________  __________________________
(Signature)            (Date)

Reviewed by host DSO: _______ Date: _______
Approved: _______ Reason/Comments:
Appendix xiii

NATIONAL AQUARIUM
DIVE PROGRAM WAIVER
AGREEMENT, INDEMNIFICATION, AND RELEASE OF CLAIMS

Participant Name:

In consideration of scuba diving under the auspices of the National Aquarium. (“Aquarium”) and participating as a diver at the National Aquarium, I, _________________ the undersigned hereby agree as follows:

1. I am aware that diving has inherent risks and dangers, known and unknown, which may result in serious injury or death. Specifically, I understand that scuba diving with compressed air involves risks including but not limited to decompression sickness, embolism or other hyperbaric/air expansion injury that may require treatment in a recompression chamber. I understand that the National Aquarium does not have a recompression chamber, and that access to a recompression chamber will require time and travel. I still choose to proceed with the dive program in spite of the absence of a recompression chamber in proximity to the dive site. I understand that diving is a physically strenuous activity and that I will be exerting myself during this program, and that I may suffer heart attack, panic, hyperventilation, and/or drowning. I understand that diving in aquarium exhibits will put me in the presence of hazardous marine life and challenging environmental conditions.

2. I hereby state that I am a competent, certified diver, with knowledge of the risks and dangers of diving. In consideration of being allowed to participate in the diving program, I hereby personally assume any and all risk of personal injury (including death) and property damage which may occur during (and/or as a result of) the above referenced activities at the Aquarium.

3. I hereby release, acquit, exonerate, and forever discharge National Aquarium and their affiliates, directors, officers, agents, volunteers, and employees (collectively, the "Released Parties") from any and all claims for personal injury (including death) and/or property damage which may occur during (and/or as result of) the above referenced activities at the Aquarium, whether or not any such personal injury (including death) and/or property damage is caused in whole or in part by the negligence of the Aquarium and/or by the negligence of any other Released Party.

4. To the extent permitted by applicable law, I hereby covenant and agree to defend, hold harmless, and indemnify the Released Parties from and against any and all claims, demands, judgments, losses, damages, punitive damages, obligations, actions, causes of action, costs, expenses, attorneys’ fees, and liabilities which any of the Released Parties may sustain, incur, or be required to pay, at any time after the date of this Agreement, whether or not any such Released Party was negligent, for personal injury (including death) and/or property damage in any manner arising in connection with (and/or as a result of) the above referenced activities at the Aquarium.
5. I hereby agree to obey all safety requirements and instructions, and to honor all restrictions and limitations, during the above referenced activities at the Aquarium.

6. This Agreement shall apply and shall be enforceable to the full extent permitted by applicable law; and if any provision of the Agreement is held or deemed to be unenforceable or void, the remaining provisions shall nevertheless continue in full force and effect.

7. I further state that I am of lawful age and legally competent to sign this liability release. I understand the terms herein are contractual and not a mere recital and that I have signed this Agreement of my own free act and with the knowledge that I hereby agree to waive my legal rights.

8. I understand and agree that I am not only giving up my right to sue the Released Parties but also any rights my heirs, assigns, or beneficiaries may have to sue the Released Parties resulting from my death. I further represent I have the authority to do so and that my heirs, assigns, or beneficiaries will be stopped from claiming otherwise because of my representations to the Released Parties.

☐ I have read, understand and agree to the above.

Signature: ____________________________________________

Date: ____________________________________________

Witness: ____________________________________________
Appendix xiv

Pre-Dive Checklist

It is the divers responsibility to do the following before any diving activity:

- Divers shall conduct a check to ensure their diving equipment is present and functional in the presence of the diving buddy or tender.
- Determine any potential hazardous conditions. 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 diving safety manual.
- 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.
- 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.
- Each diver shall have the capability of achieving and maintaining positive buoyancy.
- Dive plan submitted and approved

Required equipment for standard SCUBA mode within the facility

1. Mask
2. Fins
3. Weight belt or harness
4. BCD
5. Cylinder (minimum starting pressure 1500 psi)
6. Pressure gauge
7. Alternate air source
8. Appropriate exposure protection

Required equipment for open water SCUBA dives

1. Mask
2. Fins
3. Snorkel
4. Weight belt or harness
5. BCD
6. Cylinder (minimum starting pressure 1500 psi)
7. Pressure gauge
8. Depth gauge
9. Timing device
10. Compass
11. Alternate air source
12. Appropriate Exposure protection
13. Signaling device
### NATIONAL AQUARIUM SCIENTIFIC DIVING PROGRAM

**APPLICATION FOR SCIENTIFIC DIVER CERTIFICATION/TRAINING**

**INSTRUCTIONS:** Please fill in the requested information as completely as possible. Print legibly in ink or type. Attach requested enclosures and return to the DSO.

<table>
<thead>
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<th>Name:</th>
<th>Job Title:</th>
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<tr>
<th>NATIONAL AQUARIUM Affiliation (Employee, student, visiting investigator, guest, other):</th>
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<th>Type of Certification:</th>
<th>Full-Time</th>
<th>Temporary</th>
<th>Volunteer</th>
<th>(Circle one)</th>
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**Emergency Contact Information** (Person to notify in case of emergency)

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<th>Relationship:</th>
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<td>Work Phone:</td>
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### DIVE TRAINING CERTIFICATIONS COMPLETED

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<tr>
<th>Certification Level</th>
<th>Agency (PADI, etc.)</th>
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<th>Instructor Name and Number</th>
<th>Training Location</th>
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### RELATED TRAINING – MEDICAL, BOATING, EQUIPMENT REPAIR, ETC.

<table>
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<tr>
<th>Certification Type/Level</th>
<th>Agency (DAN, etc.)</th>
<th>Date of Completion</th>
<th>Instructor Name and Number</th>
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</table>
SWIMMING ABILITY/EXPERIENCE
Nonswimmer/Poor [ ] Average/Strong [ ] Lifesaving [ ] Water Safety Instructor [ ]

SKINDIVING EXPERIENCE (Swimming with fins, mask, and snorkel)
No Experience ( ) Novice (1-5 times) ( ) Moderate (6-50) ( ) Expert (>50) ( )

SCIENTIFIC DIVER CERTIFICATION
Organization | Expiration Date | Depth Rating | Name of Diving Officer
--- | --- | --- | ---

DIVING EXPERIENCE:  Estimated from memory [ ] Calculated from logs [ ]

<table>
<thead>
<tr>
<th>Number of Years:</th>
<th>Total Dives:</th>
<th>Total Underwater Hours:</th>
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<tbody>
<tr>
<td>Number of dives: Last 24 mos____</td>
<td>Last 12 mos____</td>
<td>Last 6 mos___</td>
</tr>
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</table>

Maximum Depth (Career): Maximum Depth (last 12 months):
Date of Last Open Water Dive____/____/____

Number of dives by depth: 0 - 30 feet:_____ 31 - 60 feet:_____.
61 - 100 feet:___ 101 - 130 feet:____ > 130 feet:______

ENVIRONMENT/TECHNOLOGY EXPERIENCE
Indicate with the appropriate letter your degree of diving experience in the following conditions, situations or equipment:

I-Inexperienced N-Novice (1-5 dives) M-Moderate (6-50) E-Extensive (>50)

| Small Boats < 20' | Blue Water (open sea) |
| Large Boats 21'-100' | Cold Water (< 45 F) |
| Ships > 100' | Turbid (< 5’ visibility) |
| Beach Entry | Ocean/Salt Water |
| Rocky Shore Entry | Fresh Water Lake, Pond, Quarry |
| Pier/Dock entry | Rivers |
| Dive Computer Assisted | Kelp forest |
| Dry Suit | Coral reef |
| Surface Supplied (Bandmask, Helmet) | Vertical (walls) |
| Hookah | Strong Currents (>1 knot) |
| Saturation | Drift Diving |
| Enriched Air (Nitrox) | Altitude (> 1000’) |
| Closed or Semi-closed circuit rebreather | Heavy Surf |
| Decompression Diving | Ice Diving |
| Decompression diving w/computer | Physical Overhead |
| Commercial Diving | Cave Penetration |
| Military Diving | Wreck Penetration |
| Other Mixed Gas | Underwater Photography |
ENCLOSURES:  Enclose the following supporting documents with this application:
1. Photocopies of all pertinent certifications (front and back)
2. Photocopy of dive log for the last 12 months
3. Reciprocity forms from home institution DSO if you are a current Scientific Diver

STATEMENT: I certify that the above information is correct and that I am in good health. I agree to follow the safety regulations of the NATIONAL AQUARIUM Diving Safety Manual and to abide by whatever limitations or restrictions may be imposed by the Diving Control Board and/or Diving Safety Officer(s).

______________________________________.     _______________________.
Signature of Candidate     Date

______________________________________.     _______________________.
Signature of Supervisor     Date

Dive Safety Officer Approval/Date        Dive Control Board Approval/Date
# Oxygen First Aid for Scuba Diving Injuries

## Common Signs and Symptoms of DCI
- Numbness and tingling
- Pain
- Muscle weakness

## Other Signs and Symptoms
- Fatigue
- Dizziness
- Headache
- Skin changes
- Cardiopulmonary
- Nausea/vomiting
- Vision problems
- Hearing problems
- Change in mental status
- Bladder/bowel dysfunction
- Coordination problems
- Tinnitus (ringing in the ears)

## Oxygen Delivery

### Scene Safety Assessment
- Stop
- Assess Scene
- Find and Locate First Aid Kit, Oxygen Unit, AED
- Exposure Protection

### Initial Assessment with Basic Life Support
- Assess responsiveness.
- Open airway. Head tilt chin lift.
- Assess breathing:
  - Breathing, conscious: Place in position of comfort; unconscious: recovery position.
  - Not breathing: Place on back and begin CPR.

### CPR
- Maintain open airway and place oronasal resuscitation mask on injured diver's face.
- Provide two normal breaths about 1 second in duration.
- Look for the chest to rise and fall.
- Use nipple line to find landmark for chest compressions.
- Deliver 30 compressions followed by 2 breaths.

### Steps for Oxygen Delivery
- Turn the oxygen on slowly with one full turn.
- Check the pressure gauge on the tank to make sure the cylinder is full.
Inform the injured diver that oxygen may help.
  - State: “This is oxygen, and it may make you feel better. May I help you?”
  - If the injured diver is unresponsive, permission to help is assumed.
  - Continuously monitor the injured diver.
  - If conscious, place the diver in a position of comfort.
  - Provide noncaffeinated, noncarbonated and nonalcoholic fluids.
  - Keep the injured diver out of the sun.
  - If unconscious, put in recovery position or on back to provide care.

**Demand Inhalator Valve**
- Constant-flow setting should be in "Off" position.
- Take a breath from demand valve and exhale away from the mask.
- Place the mask over the injured diver’s mouth and nose.
- Instruct the injured diver to breathe normally from the mask.
- Instruct the injured diver to hold the mask to help maintain a tight seal.
- Monitor the injured diver and the oxygen pressure gauge.

**Non-Rebreather Mask**
- Stretch oxygen tubing to avoid kinks.
- Attach oxygen tubing to barbed constant flow outlet.
- Set constant-flow control to 15 liters per minute (lpm).
- Prime mask reservoir bag.
- Place the mask over the injured diver’s mouth and nose.
- Adjust the mask to ensure the seal and prevent oxygen leakage.
- Instruct the injured diver to breathe normally.
- If reservoir bag deflates, increase flow rate to 25 lpm.

**Oronasal Resuscitation Mask (non-breathing diver)**
- Prepare the oronasal resuscitation mask.
- Remove oxygen tubing from the non-rebreather mask.
- Attach oxygen tubing to the barbed constant-flow outlet on the multifunction regulator and the oxygen inlet on the oronasal resuscitation mask.
- Set constant-flow control to 15 liters per minute (lpm).
- Deliver normal rescue breaths as part of CPR.
Automated External Defibrillators (AEDs) for Scuba Diving

Scene Safety Assessment
- S Stop
- A Assess Scene
- F Find and Locate First Aid Kit, Oxygen Unit, AED
- E Exposure Protection

Initial Assessment with Basic Life Support
- Assess responsiveness.
- Open airway. Head tilt chin lift.
- Assess breathing.
  - Breathing, place in recovery position (on side with head supported) or position of comfort.
  - Not breathing, place on back and begin CPR.

CPR
- Maintain open airway and place oronasal resuscitation mask on injured diver’s face.
- Provide two normal breaths about 1 second in duration.
- Look for the chest to rise and fall.
- Use nipple line to find landmark for chest compressions.
- Deliver 30 compressions followed by 2 breaths.

Using an AED
- Do not delay defibrillation to perform CPR. If the unit is available, turn it on and follow the verbal and text prompts the unit provides.
  - Place the device on the person’s left side, near the head, if possible.
- Bare and dry the chest.
  - It may be necessary to cut away clothing or wetsuits.
- Apply the pads firmly to the chest.
  - Follow the manufacturer’s directions for proper placement.
- Clear the scene both verbally and visually: “I’m clear, you’re clear, all clear.”
- Deliver the shock, when indicated.
- Following the shock, initiate 2 minutes of CPR.

- Following CPR, allow the AED to reanalyze.
  - Deliver another shock, if indicated.
- If signs of breathing returns, place the person in the recovery position and leave the AED attached.
  - Continue to monitor.
- If the AED unit determines no shock is required, the rescuer should:
  - If no signs of breathing: Reassess breathing.
    - Perform CPR for 2 minutes.
    - Then reanalyze heart rhythm.

**Turn over to EMS**

While you are waiting for emergency medical personnel to arrive:
- Continue to monitor the ABCs.
- Leave AED in place.
- Provide a brief report to EMS so they can treat the person accordingly, indicating:
  - Nature of the dive accident or incident
  - Initial condition
  - Care delivered
  - Current condition
  - Estimated time diver was not breathing and without circulation
First Aid for Hazardous Marine Life Injuries

Scene Safety Assessment
S Stop
A Assess Scene
F Find and Locate First Aid Kit, Oxygen Unit, AED
E Exposure Protection

Initial Assessment with Basic Life Support
☐ Assess responsiveness.
☐ Open airway.
☐ Assess breathing.
  ☐ Breathing, place in recovery position (on side with head
    supported) or position of comfort.
  ☐ Not breathing, place on back and begin CPR.

CPR
☐ Maintain open airway and place oronasal resuscitation mask on
  injured diver's face.
☐ Provide two normal breaths about 1 second in duration.
☐ Look for the chest to rise and fall.
☐ Use nipple line to find landmark for chest compressions.
  ☐ Deliver 30 compressions followed by 2 breaths.

Spine Punctures
Indications:
☐ Puncture or laceration
☐ Immediate pain
☐ Purple or black skin coloration
☐ Nausea
☐ Vomiting
☐ Shock
☐ Swelling
☐ Respiratory arrest
☐ Cardiac arrest

First Aid
1. Remove any visible pieces with tweezers.
2. Immerse in hot water (113°F/45°C maximum) for 30–90 minutes.
3. Clean with soap and water.
4. Irrigate vigorously with fresh water.
5. Monitor for allergic reaction and/or infection.
6. Use antivenin for stonefish, if indicated.
Stings
Indications:
- Redness, rash
- Stinging sensation
- Welts
- Burning

First Aid
1. Irrigate with salt water. Soak affected area in hot water for 30 to 90 minutes. For a box jellyfish, use a mild vinegar solution.
2. Remove tentacles with tweezers.
3. Shave area with shaving cream and safety razor.
4. Apply hydrocortisone lotion or cream.
5. Monitor for allergic reaction and/or infection.

Marine Animal Bites
Indications:
- Bleeding

First Aid
1. Control of External Bleeding
   - Apply clean dressing over the wound.
   - Apply direct pressure.
   - If possible, elevate the extremity.
   - Once bleeding stops, bandage the wound.
2. Provide supplemental oxygen.
3. Monitor for shock and/or infection.
4. If necessary, transport to nearest emergency medical facility.

Shock Management
- Ensure adequate breathing.
- Provide supplemental oxygen when available.
- Elevate feet and legs 18 inches (45cm).
- Give nothing by mouth.
Pressure Immobilization Technique
(For use with envenomation from blue-ring ed octopus, sea snakes and cone shells.)

- Place dressing over the bite.
- Apply elastic bandage firmly over the site and at least 6 inches (15 cm) on either side of the wound.
- Check for adequate circulation on the extremity.
- Splint the extremity.
- Use a sling when the wound is on the hand or arm.

Seafood Poisoning
Indications:
- Allergic reactions
- Diarrhea
- Headache
- Vomiting
- Abdominal cramps and burning
- Nausea
- Dizziness
- Paralysis
- Chills
- Muscle and joint aches
- Fever
- Reversal of perceived hot and cold sensations
- Tingling around the mouth and lips

First Aid
1. Monitor ABCs.
2. If responsive, contact Poison Control. Save fish or vomitus for analysis.
3. Seek evaluation from a medical professional when seafood poisoning is suspected.
Appendix xvii

NATIONAL AQUARIUM DIVE SAFETY OFFICER DESIGNEE APPROVAL FORM

INSTRUCTIONS: Please fill in the requested information as completely as possible. Print legibly in ink or type. Please return to the DSO upon completion.

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<thead>
<tr>
<th>Name:</th>
<th>Job Title:</th>
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<td>Highest Certification Level</td>
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<th>DIVING EXPERIENCE:</th>
<th>Estimated from memory [ ] Calculated from logs [ ]</th>
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<tbody>
<tr>
<td>Number of Years:</td>
<td>Total Dives:</td>
</tr>
<tr>
<td>Number of dives:</td>
<td>Last 24 mos</td>
</tr>
<tr>
<td>Maximum Depth (Career):</td>
<td>Maximum Depth (last 12 months):</td>
</tr>
<tr>
<td>Number of dives by depth:</td>
<td>0 - 30 feet:</td>
</tr>
</tbody>
</table>

| ________________________ | ________________________ |
| Signature of Candidate | Date |

| ________________________ | ________________________ |
| Signature of Supervisor | Date |

| ________________________ | ________________________ |
| Dive Safety Officer Approval | Date |