UNIVERSITY OF NORTH CAROLINA WILMINGTON SCIENTIFIC DIVING SAFETY MANUAL

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Document Control Sheet

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The University of North Carolina at Wilmington (UNCW) has adopted the American Academy of Underwater Sciences' ‘‘Standards for Scientific Diving Certification and Operation of Scientific Diving Programs” as the basis of its diving manual; however, UNCW has applied more stringent regulations and added sections not included in the AAUS text in an effort to increase the safe and efficient operation of diving activities.

Diving certification under the auspices of the UNCW will normally be restricted to faculty, staff, and students of UNCW. No individual may participate as a diver in a UNCW approved program without UNCW diving certification, or consent of the Diving Safety Officer.

The information contained in this manual presents the minimum acceptable safety procedures to be employed in all UNCW diving operations. No set of standard procedures can anticipate all operating situations which may be encountered, and consequently, no single individual may assume safe operation by merely following these guideline blindly. No standards will ever exist which can substitute for common sense, sound judgment, and a continuing concern for safety.

This document is a working document of the University of North Carolina at Wilmington and has been approved by the UNCW Diving Control Board.

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Acronyms

AAUS	American Academy of Underwater Sciences
ATA	Atmospheres Absolute
BCD	Buoyancy Compensator Device
CMS	UNCW Center for Marine Science (located in Wilmington, NC)
DAN	Divers Alert Network
DCB	Diving Control Board
DCS	Decompression Sickness
DSO	Diving Safety Officer
EAD	Equivalent Air Depth
MOD	Maximum Operational Depth
NAUI	National Association of Underwater Instructors
NOAA	National Oceanic and Atmospheric Administration
OSHA	Occupational Safety and Health Administration
PADI	Professional Association of Dive Instructors
PSI	Pounds per square inch
Psig	Pounds per square inch gauge
SCUBA	Self-Contained Underwater Breathing Apparatus
UNCW	University of North Carolina Wilmington
USN	US Navy

1 General Policy

1.1 Purpose

The purpose of the University of North Carolina Wilmington Scientific Diving Safety Manual (herein referred to as the UNCW Diving Safety Manual) is to set forth safety standards in compressed gas diving operations conducted under the auspices of UNCW. It is the intent of the University to ensure that all compressed gas diving conducted under University auspices is conducted in a manner that will maximize protection of divers from accidental injury or illness. It is also the purpose of this document to set forth standards for training and certification which will allow a working reciprocity between UNCW and the American Academy of Underwater Sciences (AAUS) member organizations (e.g. colleges, universities, state and federal agencies) engaged in scientific diving. Fulfillment of the purposes shall be consistent with the furtherance of research and safety.

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

The purpose of the diving safety program is to oversee the training, certification and safety of compressed gas diving conducted under the auspices of UNCW as outlined by the UNCW Diving Safety Manual.

1.2 Scientific Diving Definition

Scientific diving is defined (29 CFR 1910.402) as diving performed solely as a necessary part of a scientific, research, or educational activity by employees whose sole purpose for diving is to perform scientific research tasks.

1.3 Scientific Diving Exemption

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

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

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

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

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

e. In addition, the scientific diving program shall contain at least the following elements (29CFR1910.401):

1. Diving safety manual which includes at a minimum: Procedures covering all diving operations specific to the program; including procedures for emergency care, recompression and evacuation; and the criteria for diver training and certification.
2. Diving control (safety) board, with the majority of its members being active scientific divers, which shall at a minimum have the authority to: approve and monitor diving projects, review and revise the diving safety manual, assure compliance with the manual, certify the depths to which a diver has been trained, take disciplinary action for unsafe practices, and assure adherence to the buddy system (a diver is accompanied by and is in continuous contact with another diver in the water) for scuba diving.

1.4 Scope

This manual is to be used in conjunction with the latest edition of the AAUS Diving Standards. It is the responsibility of all participating personnel to comply with the diving policies and procedures set forth in this manual. This manual is specific to diving activities conducted under the auspices of the UNCW.

1.4.1 *Jurisdiction*

The regulations in the UNCW Diving Safety Manual shall be observed at all locations, whether or not owned by the University, where diving is carried out under University auspices.

1.4.2 *Scientific Diving*

Any UNCW program, faculty member, employee or student conducting scientific research or education requiring the use of compressed gas diving is required to adhere to the standards set down in this manual.

1.4.3 *Non-scientific Diving*

Any and all diving activities conducted under UNCW auspices that do not fall within the OSHA Scientific Diving Exemption shall follow either the standards established for recreational diving, as set down by a nationally recognized certification agency (e.g. NAUI, PADI, SSI), or the Code of Federal Regulations pertaining to commercial diving operations (29 CFR 1910 Subpart T).

1.4.4 *Training and Certification*

Any person involved in compressed gas diving under University auspices is required to observe the provisions of the UNCW Diving Manual. Diving is NOT permitted by individuals until they have met the requirements for diving pertinent to the level of the proposed activity.

1.4.5 *Liability*

In adopting the policies set forth in the UNCW Diving Safety Manual, the University assumes no liability not otherwise imposed by law. Outside of those University employees diving in the course of their employment, each diver is assumed under this policy to be voluntarily performing activities for which the diver assumes all risks, consequences and potential liability.

All students and other persons involved with compressed gas diving under University auspices shall execute a release holding the University harmless from any claims which might arise in connection with involvement with compressed gas diving. It is not necessary, however, to require

these releases from University employees, either academic or non-academic, who dive in the course of their employment.

1.4.6 *Medical Evaluation*

All divers certified as UNCW scientific divers shall pass a scientific diver medical evaluation (see Section 6).

1.5 Operational Control

1.5.1 *UNCW Auspices Defined*

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

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

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

1.5.2 *UNCW Diving Control Board (DCB)*

The DCB is an administrative committee authorized by the Director for the UNCW Center for Marine Science (CMS). Voting members shall include the Diving Safety Officer (DSO) , the Associate Director of Marine Operations, and representatives of the campus academic programs active in compressed gas diving. The DCB shall consist of no fewer than five (5) members.

The DCB has autonomous and absolute authority over the scientific diving program's operation.

The responsibilities of the DCB are as follows:

a. Shall be responsible to the Director, UNCW CMS, or his/her designee, and shall act as the official representative of the University in matters concerning compressed gas diving.
b. Shall be responsible for the setting of all University policies related to diving.
c. Shall review and revise the UNCW Diving Safety Manual and assure that it meets at least the minimum standards as prescribed by AAUS to ensure reciprocity.
d. Shall work with the DSO to assure the UNCW remains a member of AAUS.
e. Shall determine the UNCW organizational member vote on matters raised by AAUS.
f. Shall recommend changes in policy and amendments to the AAUS scientific diving manual as the need arises. These recommended changes will be submitted to the AAUS
g. Shall establish or approve training programs through which the applicants for UNCW diver certification can satisfy the requirements of the UNCW Diving Manual.
h. Shall approve or disapprove new compressed gas equipment or techniques for UNCW use.
i. Shall suspend diving programs or activities which the DCB feels to be unsafe or unwise.

j. Shall sit as a board of investigation to inquire into the nature and cause of diving accidents or violations of the UNCW Diving Manual.

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

l. Shall recommend the reissue or the revocation of diving certifications on a case by case basis.

m. Shall approve procedures for diving conducted under University auspices that are outside of the realm of standard operating procedure (SOP), or that may be deemed unusually hazardous.

1.5.3 *UNCW Diving Safety Officer (DSO)*

The UNCW DSO shall be appointed by the responsible UNCW administrative officer or designee, with the advice and counsel of the DCB. The UNCW DSO is responsible for the safety and oversight of all diving operations conducted under University auspices. The DSO will serve as a member of the DCB. The DSO should have broad technical and scientific expertise in research related diving. The DSO minimum qualifications are as follows:

a. Shall be a certified scientific diver, as specified by the UNCW Diving Safety Manual, with a wide range of diving experience, at least five years of diving experience, at least four hundred logged dives, and shall possess a current instructor's certificate issued from an internationally recognized certifying agency (e.g. NAUI, PADI, SSI) or the equivalent military diving qualifications.

b. Shall be a full member as defined by AAUS.

c. Shall possess an Oxygen Administration Instructor Certification from a nationally recognized certifying agency (e.g. DAN).

d. Shall meet all additional requirements as specified in the UNCW position description as it pertains to this position.

The DSO duties and responsibilities are as follows:

a. Shall be guided in the performance of the required duties by the advice of the DCB, but operational responsibility for the conduct of the pertinent diving program will be retained by the DSO.

b. Shall be responsible, through the DCB, for the conduct of the UNCW scientific diving program. The routine operational authority for these programs, including the conduct of training and certification, approval of dive plans, maintenance of diving records, and ensuring compliance with this standard and all relevant regulations of the UNCW Scientific Diving Program, rests with the Diving Safety Officer.

c. Responsible for the establishment and supervision of all scientific diver training programs and certifying the depths to which a diver has been trained.

d. Maintain certification records, including medical examinations, of all personnel involved in scientific diving activities under the auspices of UNCW.

e. Shall approve and monitor diving projects to assure compliance with the UNCW Diving Safety Manual.

f. Shall assure the adherence to the buddy system for compressed gas diving.

g. Shall take disciplinary action for unsafe practices. These disciplinary actions shall be reported to the DCB.

h. Shall suspend diving operations considered to be unsafe or unwise.

i. Responsible for the evaluation and supervision of the compressed gas (e.g. SCUBA equipment) and dive safety equipment maintenance programs, including arranging for or conducting tests of breathing gases and the approval or certification of University sources of breathing gases.

j. The DSO may permit portions of this program to be carried out by a qualified delegate, although the DSO may not delegate responsibility for the safe conduct of the local compressed gas diving program.

k. Preparation of recommendations for consideration by the DCB, such as changes in, or additions to, the UNCW Diving Safety Manual, policies or regulations to promote diving safety and efficiency; changes in training programs; and, new equipment or diving techniques.

l. Shall be a voting member of the DCB.

1.5.4 *Divemaster*

The Divemaster will act as the on-site representative of the Diving Safety Office for scientific diving projects and will participate on dives from UNCW vessels in waters deeper than 60' or farther than 3 nm from shore, and all other dives which present unusual or difficult circumstances. The vessel Captain can also fulfill the role of Divemaster.

a. Qualifications

1. Will meet all the qualification criteria for Scientific Diver as outlined in Section 5.00.
2. Logged a minimum of 100 hours of documented dive time (underwater).
3. Hold current CPR, First Aid, and Oxygen Administration certifications.
4. Successfully completed an approved Diver Rescue Course.
5. Diving experience in a variety of conditions including cold water, current, low visibility, and from large and small vessels.
6. Practical experience supervising divers in various conditions.

b. Responsibilities and Duties include:

1. Coordination with other known activities in the vicinity which are likely to interfere with diving operations.
2. Ensuring all dive team members possess current certification and are qualified for the type of diving operation to be undertaken.
3. Working with Lead Diver to plan dives in accordance with section 2.20.
4. Ensuring safety and emergency equipment is in working order and at the dive site.
5. Modifications to diving or emergency procedures necessitated by the specific diving operation.
6. Suspending diving operations if in his/her opinion conditions are not safe.
7. Reporting to the DSO and DCB any physical problems or adverse physiological effects including symptoms of pressure-related injuries.
8. In-water supervision of individuals who hold a Diver-in-Training permit.

1.5.5 *Lead Diver*

For all diving operations not requiring a Divemaster, one individual shall be designated as the Lead Diver who shall be at the dive location during the diving operations. The Lead Diver shall be responsible for:

a. Coordination with other known activities in the vicinity that are likely to interfere with diving operations.

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

c. Planning dives in accordance with Section 2.20.

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

e. Briefing dive team members on:

    1. Dive objectives.

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

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

f. Suspending diving operations if, in their opinion, conditions are not safe.

g. Reporting to the DSO any physical problems or adverse physiological effects, including symptoms of pressure-related injuries, exhibited by any member of the dive team after diving.

h. Ensuring all the proper post project paperwork is completed and submitted to the Diving Safety Office.

1.5.6 *AAUS Reciprocity and Visiting Scientific Diver*

a. When UNCW is engaged with one or more AAUS Organizational Members jointly in diving activities, or engaged jointly in the use of diving resources, then a single DCB must be designated to govern the joint dive project.

b. A Scientific Diver from another recognized research facility shall apply for permission to dive under the auspices of the UNCW Scientific Diving Program by submitting to the appropriate UNCW DSO a document containing all the information described in the Appendix 1 (Reciprocity Form) signed by the Diving Safety Officer or Chairperson of the home Diving Control Board.

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

d. If UNCW denies a visiting Scientific Diver permission to dive, the UNCW DSO or the UNCW DCB shall notify the visiting Scientific Diver and their home institution DSO with an explanation of all reasons for the denial.

e. A diver with current NOAA Diving Certification can apply for reciprocity to dive under UNCW auspices by submitting a Letter of Certification to Dive signed by the Director of the NOAA Diving Program and attach verification of current diving status signed by his/her NOAA Unit Diving Supervisor.

f. A diver with military diver training and certification can apply for reciprocity by submitting certification documents and evidence of active military diving duty orders along with a current, approved diving physical examination.

g. A diver from a non-AAUS institution may be granted reciprocity after review of the individual's diving program standards and procedures, certifications, dive logs, proposed dive plan and current, approved diving physical examination.

1.5.7 *Waiver of Requirements*

The UNCW DSO may grant a waiver for specific requirements of training, examinations, depth certification, and minimum activity to maintain certification.

1.6 Consequence of Violation of Regulations by UNCW Scientific Divers

Failure to comply with the regulations of the UNCW Diving Safety Manual may be cause for the revocation or restriction of the diver's scientific diving certificate by action of the UNCW DSO.

1.7 Consequence of Violation of AAUS Regulations by the UNCW Scientific Diving Program

Failure to comply with the regulations set by the AAUS may be cause for the revocation or restriction of UNCW Scientific Diving Program's recognition by AAUS.

1.8 Record Maintenance

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

1.8.1 *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 DSO for the following period:

    a. UNCW Diving Safety Manual – current document only

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

    c. Training and qualification records – 5 years after termination of service from UNCW.

    d. Physician's written reports of medical examinations for each diver – 5 years.

    e. Record of dives – 5 years, except indefinitely where there has been an incident of pressure related injury.

    f. Diving incident reports – indefinitely.

1.9 Public Records

University research records are subject to both federal and state laws. Requests for information under the federal Freedom of Information Act (FOIA) should be made through the UNCW Office of Research Services. Requests for information under North Carolina Public Records Law should be made to the UNCW General Counsel.

2 Diving Regulations for SCUBA (Open Circuit, Compressed Air)

2.1 General Policy

No person shall engage in scientific diving operations under the auspices of the UNCW scientific diving program unless they hold a current certification issued pursuant to the provisions of these standards and they have filed a dive plan with the DSO.

2.2 Pre-Dive Procedures

2.2.1 *Dive Plans*

Dives should be planned around the competency of the least experienced diver. Before conducting any diving operations under the auspices of the UNCW, the lead diver for a proposed operation must complete and submit a dive plan on the "Dive Plan Form" found in the Appendix 2 of this manual. This dive plan should include the following information:

a. Each diver's qualifications and depth limit.
b. Divemaster or Lead Diver participating in planned activity (if applicable).
c. Emergency Plan
    1. Name, telephone number, and relationship of person to be contacted for each diver in the event of an emergency.
    2. The procedure necessary to activate the EMS in the area.
    3. Diver's Alert Network's medical emergency contact number to be used to locate the nearest recompression chamber should it be necessary.
    4. Available means of transport.
d. Approximate number of proposed dives.
e. Location(s) of proposed dives.
f. Estimated depths(s) and bottom time(s).
g. Decompression status and repetitive dive plans, if required.
h. Proposed work, equipment and boats to be employed.
i. Any hazardous conditions anticipated.

2.2.2 *Pre-dive Safety Checks*

a. Diver's Responsibility:
    1. Scientific divers shall conduct a functional check of their diving equipment in the presence of the diving buddy or tender.
    2. It is the diver's responsibility and duty to refuse to dive if, in their judgment, conditions are unfavorable, or if they would be violating the precepts of their training or the standards set forth in the UNCW Diving Safety Manual.
    3. No dive team member shall be required to be exposed to hyperbaric conditions against their will.

4. No dive team member shall be permitted to dive with a known condition(s), which is likely to adversely affect the safety and health of the diver or other dive participants.
5. Methods of escape to the surface are to be fully discussed between dive buddies prior to commencing diving operations. Discussions should include location of an alternate air source and methods to affect a safe ascent.

b. Equipment evaluations
    1. Each diver 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.
    3. Each diver shall have an underwater time-keeping device, an approved depth indicator and submersible tank pressure gauge.

c. Site Evaluation
    1. The environmental conditions at the site will be evaluated prior to commencing diving operations.

2.3 Diving Procedures

2.3.1 *First Aid supplies and Oxygen*

A first aid kit, suitable for diving, and emergency oxygen (e.g. DAN O_2 kit) shall be available at the dive site at all times.

2.3.2 *Dive Flag*

When diving in areas capable of supporting marine traffic, a rigid replica of the international code flag “A” or the red and white “diver down” sport diving flag (as appropriate for the dive location) shall be displayed at the dive location in a manner which allows all-around visibility, and shall be illuminated at night.

2.3.3 *Divemaster*

All scientific diving activities conducted from UNCW vessels in waters deeper than 60’ or farther than 3 nm from shore, and all other dives which present unusual or difficult circumstances shall be under the supervision of a Divemaster. The Divemaster will be responsible for all diving activities and will cooperate with the vessel captain to ensure the safety of all aboard. The vessel Captain can also fulfill the role of Divemaster.

a. When diving operations take place in protected waters near shore (within 3 nm), at depths less than 60’, and at the discretion of the DSO, a designated Lead Diver may substitute for the Divemaster.
b. Due to special conditions that might include, but are not limited to, winter weather, remote dive sites, depth of dives, and diving mode, the DSO may at any time require additional qualified personnel aboard the diving platform or vessel.

2.3.4 *The Dive Team*

The dive team shall consist of at least two divers, unless the diver is tended from the surface or using surface supplied diving equipment. The divers are required to maintain buddy contact throughout the dive. The guidelines for effective buddy contact include staying in visual contact, maintaining effective communication and being in a position to render assistance if necessary. In

situations of limited or low visibility, when visual contact may be difficult or impossible, it is recommended that dive team members maintain contact or use a buddy line.

2.3.5 *Solo Diving Prohibition*

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

2.3.6 *Lost Buddy*

If a buddy team gets separated, spend no more than one (1) minute looking for the lost buddy. If unable to relocate the buddy, then surface and wait until the buddy arrives at the surface and regain buddy contact. If the buddy does not surface, return to the dive platform immediately and report to the on-site Divemaster or Lead Diver.

2.3.7 *Sea Conditions*

Acceptable sea conditions for safe diving depend on a number of conditions, including mode of getting to/from the dive location, tasks to be performed, equipment to be used, and personnel qualifications. The on-site Divemaster, Lead Diver, or the vessel Captain will determine whether acceptable weather conditions exist for conducting safe diving.

2.3.8 *Boat Diving*

a. During any diving activities involving vessels, there must be a qualified operator onboard the vessel at all times. Vessel operator qualifications are listed in the *UNCW Guide for Safe Boating Operations* (guide can be found at http://www.uncw.edu/cms/FacilitiesDivingSafety.htm).

b. Vessels used for UNCW sanctioned diving must meet or exceed the *UNCW Guide for Safe Boating Operations* and must minimally meet US Coast Guard regulations for safety at sea.

c. Live boating operations require approval of the vessel Captain and the DSO. An ascent/descent line, fixed mooring line, or diver towed buoy is required for all live boating operations. See Appendix 3 for the detailed operational procedures.

d. Live boating operations shall be prohibited when horizontal surface visibility is less than 250 feet.

2.3.9 *Refusal to Dive*

The decision to dive is that of the diver.

a. A diver may refuse to dive, without fear of penalty, whenever he/she feels it is unsafe for them to make the dive

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

c. If a diver feels that unsafe diving activities are being undertaken, or were undertaken, that could result in serious injury or death, it is the diver’s responsibility to refuse to continue diving under these conditions and to complete a detailed report of the incident. For further information and reporting guidelines, see Section 2.7.2 (e).

2.3.10 *Termination of the Dive*

a. It is the responsibility of the diver to terminate the dive, without fear of penalty or repercussion, whenever they feel it is unsafe to continue the dive, unless it compromises the safety of another diver already in the water.

b. The dive shall be terminated while there is still sufficient cylinder pressure to permit the diver to safely return to the surface. This would include any required decompression time, or to safely reach an additional air source at the decompression station. Each diver should return to the surface or safety stop with a minimum of 500 psi in his/her single or double SCUBA cylinders.

2.3.11 *Safety Stops*

For all no-decompression dives deeper than 60' or repetitive dives, an in-water safety stop between 15 and 20 feet for 3 to 5 minutes is recommended.

2.3.12 *Missed Decompression (Adapted from US Navy Decompression Tables and Procedures, Part Three, Presented by the NOAA Diving Center, Seattle, WA*

a. Should a dive team using dive tables for dive planning purposes realize that they have exceeded the no-decompression limits prior to reaching the surface, and they do not have access to USN decompression tables to determine required in-water decompression time, the diver and his/her buddy should:

    1. Stop between 10' – 20' for a minimum of 15 minutes or until they reach 300 psi in their cylinder, whichever comes first.

    2. Once on the surface, **if the decompression obligation has not been met**, the dive team should be placed on oxygen for a minimum of 30 minutes, observed, and restricted from diving for 12 hours.

    3. If symptoms occur during or after breathing oxygen for 30 minutes, the diver should be transported (on oxygen) to the nearest medical facility for treatment.

b. Should a dive team using dive computers exceed the no-decompression limit, the dive team shall follow the decompression stop requirements as specified by the dive computer. See Appendix 4 for Dive Computer Guidelines.

c. Should a dive team not realize that they have exceeded the no-decompression limits prior to reaching the surface, or they have insufficient tank pressure to perform in water decompression stops, they should:

    1. Proceed to the surface at a normal rate of ascent.

    2. Once on the surface they should notify the Divemaster of their omitted decompression.

    3. If asymptomatic, and the diver/dive team can be returned safely to the water within 5 minutes of surfacing, they should dive to the depth of the missed decompression stops and remain for 1 ½ times the required decompression stop time.

    4. If the diver cannot be returned to the water within 5 minutes, they should be placed on oxygen for a minimum of 60 minutes.

    5. If asymptomatic after breathing oxygen for 60 minutes, they should be observed for a minimum of 12 hours for signs and symptoms of decompression sickness (DCS) and restricted from diving during this observational period.

6. If symptoms occur during or after breathing oxygen for 60 minutes, he/she should be transported (on oxygen) to the nearest medical facility.

2.3.13 *Hours of Operation*

Normal work hours for personnel engaged in diving activities should not exceed twelve (12) hours during any twenty-four (24) hour period. A minimum rest period of eight (8) continuous hours is required during each twenty-four (24) hour period for all diving personnel.

2.3.14 *Emergencies and Deviations from Regulations*

Any diver may deviate from the requirements of this manual to the extent necessary to prevent or minimize a situation which is likely to cause death, serious physical harm, or major environmental damage. A written report of such actions must be submitted to the appropriate DSO and the DCB explaining the circumstances and justification for their actions.

2.4 Post-Dive Procedures

2.4.1 *Post-Dive Safety Checks*

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

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

2.4.2 *Log Dives*

After completing each dive, dive team members should log their dives on the UNCW Dive Log forms (Appendix 5). Completed dive logs must be submitted to the DSO as soon as the divers return to their home institution/facility. Additional dive log requirements are listed in Section 2.7, Record Keeping.

2.5 Emergency Procedures

A diving accident victim could be any person who has been breathing compressed gas underwater regardless of depth. It is essential that emergency procedures are pre-planned and that medical treatment is initiated as soon as possible. Each dive team is required to list all emergency contact numbers as well as nearest operational decompression chamber, nearest medical center and means of transport are required information for the Dive Plan. See Appendix 6 for additional Diving Accident Management Procedures.

2.5.1 *General Procedures*

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

a. Make appropriate contact with victim or rescue as required.

b. Establish (A)irway, (B)reathing, (C)irculation, (D)efibrillate as required. Administer Oxygen.

c. Stabilize the victim

d. Notify the local Emergency Medical System (EMS) or US Coast Guard for transport to nearest medical treatment facility. Explain the circumstances of the dive incident to the evacuation teams, medics and physicians. Do not assume that the EMS personnel

understand why 100% oxygen may be required for the diving accident victim or that recompression treatment may be necessary.

e. If necessary contact Diver's Alert Network (DAN) for the location of the nearest operational recompression facility.

f. Notify the UNCW DSO of any diving related emergency. If unable to reach the DSO, contact the CMS Assistant Director of Marine Operations or the UNCW Environmental Health and Safety Office to report the emergency. Contact names and phone numbers are listed in the Diving Accident Management Plan.

2.5.2 *Notification of Diving Accident within UNCW*

The Director for the UNCW CMS will be notified within 24 hours of all diving related injuries. The Director, or his/her designee, will contact the appropriate UNCW offices and officials and provide, at minimum, the following information:

a. Personnel involved

b. Nature and cause of the injury

c. Physician contacted or consulted

d. Action taken

e. Status of the situation

f. Future plan of action

2.5.3 *Incident Review*

All Incident Reports will be reviewed by the UNCW DSO, UNCW Environmental Health and Safety Office and the DCB. Following this review, the DSO, on behalf of the DCB, will complete and submit an Incident Report Form to AAUS (www.aaus.org). See section 2.7, Record Keeping, for additional details.

2.5.4 *Temporary Disqualification from Diving*

Divers treated for any barotrauma incident shall not engage in diving activities until approved, in writing, by a qualified diving physician.

2.6 Flying after Diving or Ascending to Altitude (Over 1000 Feet)

a. Following a single No-Decompression dive, divers should have a minimum pre-flight surface interval of 12 hours.

b. Following multiple dives per day or multiple days of diving, divers should have a minimum pre-flight surface interval of 18 hours.

c. Following dives requiring decompression stops, divers should have a minimum pre-flight surface interval of 24 hours.

d. Before ascending to altitudes above 1000 feet by land transport, divers should follow the appropriate guideline for pre-flight surface intervals unless the decompression procedure used has accounted for the increase in elevation.

2.7 Record Keeping

2.7.1 *Dive Logs*

Each certified scientific diver is required to log every dive made under the auspices of UNCW and is encouraged to log all other dives (e.g. recreational dives). Completed dive logs must be submitted to the DSO as soon as the divers return to their home institution/facility. The DSO will place all dive logs in the diver's permanent file.

See Appendix 5 for the UNCW Dive Log. The diving log shall include at least the following:

a. Dive team member names
b. Date, time, and location
c. General nature of diving activities
d. Diving modes used (e.g. open circuit, surface supplied)
e. Breathing gas used, if Nitrox, list diver verified O_2 percentage
f. Planned maximum depth and time
g. Actual maximum depth, bottom time and surface interval
h. Diving tables or computers used
i. Detailed report of any near or actual incidents

2.7.2 Required Incident Reporting

All diving incidents requiring recompression treatment, or resulting in moderate or serious injury, or death shall be reported to the DSO, the DCB and the AAUS. The report will specify the circumstances of the incident and the extent of any injuries or illnesses. Additional information must meet the following reporting requirements:

a. If pressure-related injuries are suspected, or if symptoms are evident, the following information shall be recorded and, along with the dive log, retained indefinitely by UNCW.
    1. Complete AAUS Incident Report Form (Available from the Diving Safety Office)
    2. Written descriptive report to include:
        i. Name, address, phone numbers of the principal parties involved
        ii. Summary of the experience of each diver
        iii. Location, description of dive site and description of environmental conditions
        iv. Description of events leading up to the incident
        v. Dive profile (as listed on dive log or downloaded from dive computer)
        vi. Description of symptoms, including time of onset
        vii. Description of on-site first aid provided and emergency medical facilities contacted for transport/treatment
        viii. Description and results of hyperbaric or medical treatment
        ix. Disposition of case
        x. Recommendations to avoid repetition of incident

b. All occupational diving related injuries or illnesses of UNCW employees, which require medical attention, must be recorded and reported to the DSO and the UNCW Environmental Health and Safety Office. Use the following guidelines and forms for reporting purposes:
    a. Appendix 7 – Worker's Compensation, Accident Reporting and OSHA Recordkeeping
    b. Appendix 8 – Employee's Statement for Work Related Injury
    c. Appendix 9 – Supervisor's Accident Report Form
c. The DSO and UNCW Environmental Health and Safety Office shall investigate and document any diving incident or injury, requiring medical attention beyond first aid, within 30 days of the incident and prepare a report which is to be retained indefinitely. A copy of this report shall be forwarded to the UNCW DCB immediately upon completion and a copy of the report shall be sent to AAUS during their annual reporting cycle.
d. The DSO and Environmental Health and Safety Office shall investigate and document any diving incident that results in death or the hospitalization of 3 or more individuals within 8 hours of the incident. To report a diving related fatality or an incident that results in the hospitalization of 3 or more individuals, contact the following individuals:
    a. UNCW DSO: (910) 962-2578, or (910) 520-5243
    b. The UNCW Environmental Health and Safety Office phone number (910) 962-3108, or, if after hours, contact the Environmental Health and Safety Office pager (910) 254-5830.
e. A detailed report of any incident which, in the opinion of the diver, Divemaster, or other team member, could have resulted in serious injury or death shall be submitted to the DSO and the DCB. This information shall be reviewed by the DSO and DCB, and appropriate recommendations will be made or actions taken.

2.8 Consequences of Violation of Regulations

Failure to comply with the regulations of this manual may be cause for the revocation or restriction of the diver's University diving certificate.

3 Diving Equipment

3.1 General Policy

All equipment used by certified scientific divers and trainees, regardless of ownership, shall conform to the standards set forth in this manual as determined by the DSO or the DCB.

a. All inspections, tests and maintenance of UNCW equipment referred to in this section must be accomplished by the DSO or a qualified technician approved by the DSO.

b. Individual diver-owned equipment shall be inspected and maintained annually by a qualified scuba equipment repair facility. Maintenance records must be provided to the DSO if requested.

c. All equipment shall be examined by the person using it prior to each dive and defective gear shall be repaired or replaced before further use.

d. Equipment that is subjected to extreme usage under adverse conditions should require more frequent testing and maintenance.

3.2 SCUBA Equipment

3.2.1 *Regulators*

a. Only those makes and models specifically approved by the DSO or their designee shall be used.

b. SCUBA regulators procured by the University and those privately owned and used on University connected projects shall be inspected and tested prior to first use and every twelve months thereafter.

c. Regulators will consist of a primary second stage, an alternate air source (e.g. octopus second stage, redundant air supply), submersible pressure gauge or air-integrated dive computer, and a low pressure inflator (BC/Dry Suit).

3.2.2 *Breathing Masks and Helmets*

An orientation/check-out dive is required for use of full-face masks and helmets. Breathing masks and helmets shall have:

a. A non-return valve at the attachment point between helmet or mask 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 he/she is diving.

3.2.3 *SCUBA Cylinders*

SCUBA cylinders shall:

a. be designed, constructed, and maintained in accordance with the applicable provisions of the Unfired Pressure Vessel Safety Orders.

b. be hydrostatically tested in accordance with DOT standards.

c. have an internal and external inspection at intervals not to exceed twelve months.

d. be functionally tested at intervals not to exceed twelve months.

3.2.4 *Gauges*

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

3.2.5 *Floatation Devices*

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

b. Personal flotation systems, buoyancy compensator devices (BCD), and dry suits shall be equipped with at least one exhaust valve.

c. BCDs must be capable of inflation by two sources (automatic and manual).

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

3.2.6 *Timing Devices, Depth and Pressure Gauges*

All Dive Team members must have an underwater timing device, an approved depth indicator, and a submersible pressure gauge. An approved dive computer can be used as an underwater timing device and depth indicator.

3.2.7 *Determination of Decompression Status: Dive Tables, Dive Computers*

a. A set of approved dive tables (e.g. US Navy, NAUI) must be available at the dive location.

b. Dive computers may be used in place of dive tables. See Appendix 3 for Dive Computer guidelines.

   1. Divers desiring approval to use a dive computer as a means of determining required decompression status must apply to the Diving Safety Office, and complete a practical training session. .
   2. Each diver in a buddy team must have their own dive computer.
   3. On any given dive, both divers in a buddy team must follow the most conservative dive computer.
   4. If the dive computer fails at any time during the dive, the dive must be terminated and appropriate surfacing procedures should be initiated immediately.

3.2.8 *Harnesses and Weight Belts*

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

3.3 Auxiliary Equipment

3.3.1 *Hand held underwater hydraulic and pneumatic tools*

Hydraulic and pneumatic tools used underwater shall be approved for this purpose. Proper training in use of these tools is required.

3.3.2 *Diver propulsion vehicles*

Diver propulsion vehicles may be operated only by divers familiar with their use. For other than training purposes, the use of underwater scooters requires that at least two such devices be in use at the same time.

3.3.3 *Other*

Any diver wishing to use equipment not covered in this manual must receive approval from the DSO prior to operational use underwater.

3.4 Support Equipment

3.4.1 *First Aid Supplies and Oxygen*

a. A first aid kit, suitable for diving, as well as other accidents, is required at the dive site.

b. Emergency oxygen must be available at the dive site and each diver must be currently certified to administer emergency oxygen.

3.4.2 *Dive Flag*

When diving in areas capable of supporting marine traffic, a rigid replica of the international code flag “A” or the red and white “diver down” sport diving flag (as appropriate for the dive location) shall be displayed at the dive location in a manner which allows all-around visibility, and shall be illuminated at night.

3.4.3 *Compressor Systems*

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

a. All air compressor intakes shall be located away from areas containing exhaust or other contaminants to ensure a supply of clean air, free from contamination by fumes, smoke, etc.

b. The discharged compressed air shall be passed to a compressed air holder through frequently cleaned and recharged filters designed to remove carbon monoxide, dust, and droplets of oil and water, and to minimize other contaminants.

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

d. Compressed gas systems over 500 psig shall have slow-opening supply valves.

e. Oil lubricated compressor cylinders and coolers shall be well ventilated or otherwise cooled, or the operation cycled to ensure against high temperatures at which CO is formed from the oil.

3.4.4 *Oxygen Systems*

a. Equipment used with 100% oxygen or mixtures containing over 40% by volume of oxygen shall be designed and maintained for oxygen service.

b. Components exposed to 100% oxygen or mixtures containing over 40% by volume of oxygen shall be cleaned of flammable materials before being placed into service.

c. Oxygen delivery systems over 125 psig shall have slow-opening supply valves.

3.5 Equipment Maintenance

All diving equipment, accessories and diving systems shall be maintained in accordance with the manufacturer's recommendations. Equipment with known deficiencies shall be tagged and not used until repaired and tested.

3.5.1 *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. Buoyancy control devices
e. Dry suits
f. Dive computers
g. SCUBA cylinders
h. Cylinder valves
i. Diving helmets
j. Submersible breathing masks (e.g. full face masks)
k. Compressors
l. Gas control panels
m. Air storage cylinders
n. Air filtration systems
o. Nitrox storage cylinders
p. Hyperbaric chambers

3.5.2 *Compressor Operation and Air Test Records*

a. Gas analyses and air tests shall be performed on each UNCW controlled breathing air compressor at regular intervals of no more than 100 hours of operation or six months, whichever occurs first. The results of these tests shall be entered in a formal log and be maintained.
b. A log shall be maintained showing operation, repair, overhaul, filter maintenance, and pressure adjustment for each compressor.

3.6 Air Quality Standards

Breathing air for scuba shall meet the following specifications as set forth by the Compressed Gas Association (CGA Pamphlet G-7.1) and referenced in OSHA 29 CFR 1910.134.

CGA Grade E	
Component	**Maximum**
Oxygen	20 – 22%/v
Carbon Monoxide	10 PPM/v
Carbon Dioxide	1000 PPM/v
Condensed Hydrocarbons	5 mg/m^3
Total Hydrocarbons as Methane	25 PPM/v
Water Vapor	2 PPM
Objectionable odors	None

For breathing air used in conjunction with a 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.

3.6.1 *Non-University Controlled Sources*

Breathing-air from commercial sources approved by University authorities shall be certified by the supplier as suitable for breathing, according to specifications in Section 3.6.

4 Entry Level Training – Eligibility and Prerequisites

4.1 Overview

This section describes eligibly requirements and prerequisites which must be met before an individual can participate in UNCW scientific diver training.

4.2 Eligibility

Only persons requiring scientific diving under UNCW auspices are eligible for University training and certification. No individual can participate as a diver in an UNCW approved project/program without appropriate diving certification. No person shall engage in scientific diving unless that person is authorized by an institution pursuant to the provisions of this manual.

4.3 Prerequisites

4.3.1 *SCUBA Certification*

Persons desiring certification as a UNCW scientific diver must first hold a valid SCUBA certification from a nationally recognized diving instructional agency (e.g. NAUI, PADI, YMCA, US Navy) Verification of prior training and experience must be submitted to the DSO along with a UNCW Diver Application.

4.3.2 *UNCW Diver Application*

Persons desiring training must submit a completed UNCW Diver Application form to the DSO. The form is located in Appendix 10.

4.3.3 *Proof of Medical Insurance*

a. Employees: UNCW employees are covered under Workman's Compensation for any diving activity conducted under the auspices of UNCW.

b. Graduate and Undergraduate Students: All full-time UNCW students (graduate and undergraduate) are required by the University to possess major medical coverage. The DSO will work with the Environmental Health and Safety Office to assure major medical coverage for student scientific divers has not lapsed.

c. Additional Insurance Coverage: In some cases, (such as remote or international projects) the DSO may require that additional diving accident coverage be purchased by employees and students. Typical suppliers for this coverage include, but are not limited to, Divers Alert Network (DAN), Professional Association of Diving Instructors (PADI), and National Association of Underwater Instructors (NAUI).

4.3.4 *Medical Examination*

The applicant for training shall be certified by a licensed physician to be medically qualified for diving before proceeding with the training. See Section 6 – Medical Standards for further information on the medical examination requirements. Medical certification forms must be submitted to the DSO.

4.3.5 *Swimming Evaluation*

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

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.

4.3.6 *SCUBA/Skin Diving Evaluation*

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

a. Enter water with full dive gear
b. Clear their face mask
c. Recover and clear a “lost” regulator
d. Demonstrate understanding of underwater signs and signals
e. Demonstrate ability to remove and replace equipment while submerged
f. Demonstrate air sharing, including both buddy breathing and the use of the alternate air source, as both donor and recipient, with and without a face mask
g. Using mask, fins, and snorkel, kick on the surface 200 yards, demonstrating five surface dives over the course of the exercise

4.3.7 *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

4.3.7 *First Aid and CPR*

The applicant must have current Adult CPR and First Aid from a nationally recognized agency (e.g. Red Cross, American Heart Association). This training is provided by the UNCW Environmental Health and Safety Office for UNCW personnel and students who wish to enroll in Scientific Diver training.

4.4 Scientific Diver Training

After the applicant has successfully completed the prerequisites outlined in this section, the individual can then participate in Scientific Diver training in order to then be eligible to participate in research diving conducted under UNCW auspices. Scientific diver training requirements are specified in Section 5 – Scientific Diver Certification.

5 Scientific Diver Certification

5.1 Overview

Scientific diver certification is issued to UNCW personnel and students participating in scientific diving under University auspices. The diver must complete theoretical aspects and practical training for a cumulative minimum time of 100 hours.

Upon completion of the requirements for Scientific Diving Certification, a Scientific Diving Certificate will be placed in the diver's record. A copy of this certificate is available to the diver upon request to the DSO. A diver's qualifications, as stated on the initial certificate, may be changed by the DSO to reflect additional experience or training.

5.2 Requirements for Scientific Diver Certification

Submission of documents and participation in aptitude examinations does not automatically result in certification. The applicant must convince the DSO that he/she is sufficiently skilled and proficient to be certified. This skill will be acknowledged by the signature of the DSO. Any applicant who does not possess the necessary judgment, under diving conditions, for the safety of the diver and his/her partner, may be denied scientific diving privileges.

5.2.1 *Prerequisites*

All prerequisites, as described in Section 4 of this manual, must be completed before anyone can begin Scientific Diver training.

5.2.3 *Release and Waiver*

Non-University employees, including undergraduate students, must complete the "UNCW Release of Liability, Waiver of Claims, Assumption of Risk and Indemnification Agreement for Scientific Diving" form, found in Appendix 11, and submit it to the DSO.

5.2.4 *Theoretical and Practical Training*

Participants in Scientific Diver training must complete theoretical and practical training for a minimum cumulative time of 100 hours. Theoretical aspects will include principles and activities appropriate to the intended area of scientific study. Practical, or hands-on, training may include in-field training at the work location.

a. Required topics include, but are not limited to:
    1. Diving Emergency Care
        i. CPR
        ii. Standard or Basic First Aid
        iii. Oxygen Administration
        iv. Accident Management
        v. Field Neurological Exam
        vi. Recognition of Decompression Sickness and Arterial Gas Embolism
    2. Dive Rescue

3. Dive Physics
4. Decompression Theory and Application
5. Dive Physiology
6. Underwater Habitats and Environments
7. AAUS/UNCW Scientific Diving Regulations and History
    i. Scientific Dive Planning
    ii. Coordination with other Agencies
    iii. Appropriate Government Regulations
8. Scientific Method
9. Data Gathering Techniques (Only items specific to area of study are required)
    i. Site Selection, location, re-location
    ii. Specialize equipment for data gathering
    iii. Transect sampling (Quadrating)
    iv. Transecting
    v. Mapping
    vi. Coring
    vii. Photography
    viii. Tagging
    ix. Collecting
    x. Animal handling
    xi. Archaeology
    xii. Common biota (identification, behavior, ecology)
    xiii. Videography
10. HazMat Training
    i. HP Cylinders
    ii. Chemical hygiene, if required

b. Suggested topics include, but are not limited to:
    1. Specific dive modes
        i. Open Circuit
        ii. Hooka
        iii. Surface supplied
    2. Research vessel operations
    3. Live Boating
    4. Specialized breathing gas
        i. Nitrox

ii. Mixed Gas (e.g. Trimix)

5. Specialized environments and conditions
    i. Blue water diving
    ii. Cold water diving
    iii. Ice and polar diving
    iv. Zero visibility diving
    v. Polluted water diving
    vi. Saturation diving
    vii. Decompression diving
    viii. Overhead environments
    ix. Aquarium diving
    x. Night diving
    xi. Kelp diving
    xii. Diving in strong currents
    xiii. Potential entanglement
6. Specialized diving equipment
    i. Dry suit
    ii. Full-face mask
    iii. Communications equipment

5.2.5 *Examinations and Check-out Dives*

Examinations and check-out dives will be completed by the DSO or their designated representative (e.g. CPR and First Aid courses may be completed by qualified instructors with the UNCW Environmental Health and Safety Office).

a. Written examinations include:
    1. Diving knowledge exam required for scientific diver certification which tests the participants theoretical and practical diving knowledge as listed in section 4.3.7
    2. Emergency Oxygen Administration
    3. First Aid and CPR
b. Equipment evaluation
    1. Personal dive equipment use, set-up, function
    2. Task specific equipment
c. Skin Diving evaluation
    1. Proper donning of equipment
    2. Adjust weights (if necessary) for proper buoyancy control to experience neutral buoyancy at the surface
    3. Surface dive to a depth of 10 to 20 feet and recover an object

4. Ascend from depth, demonstrating control, and proper ascent and surfacing techniques, including snorkel clearing
5. Equalize all air spaces in equipment and body during descent
6. Demonstrate self-rescue techniques, including ditching weights and relieving cramps
7. Assist and transport another diver on the surface
8. Demonstrate correct procedures for entries and exits from the water
9. Demonstrate proficiency in all required skills, and fitness for skin diving

d. SCUBA Diving evaluation - practical training must include a checkout dive with a 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. During the check-out dive, the trainee must satisfy the DSO of his/her ability to perform at minimum, the following in open water at the appropriate depth:

1. Plan and execute a dive
2. Enter and leave open water or surf, or leave and board a diving vessel, while wearing SCUBA gear
3. Kick on the surface 400 yards while wearing scuba gear, but not breathing from the scuba unit
4. Demonstrate clearing of mask and regulator while submerged
5. Demonstrate ability to achieve and maintain neutral buoyancy while submerged
6. Demonstrate, where appropriate, the ability to maneuver efficiently in the environment, at and below the surface
7. Navigate underwater
8. Demonstrate proficiency in air sharing as both donor and receiver
9. Complete a simulated emergency swimming ascent
10. Demonstrate techniques of self-rescue and buddy rescue
11. Demonstrate judgment adequate for safe diving
12. The 11 dives following the checkout dive must be supervised by a certified Scientific Diver with experience in the type of diving planned, with the knowledge and permission of the DSO.

5.2.6 *Waiver of Specific Requirements*

If an applicant for certification can show evidence of previous qualifying experience and training, a waiver of specific requirements may be granted. The requirements for medical evaluation, liability release, or medical insurance shall not in any case be waived.

5.2.7 *Completion of certification requirements*

Once an individual has completed the required training and passed all examinations, both written and practical, to the satisfaction of the DSO, the individual can then be certified as a Scientific Diver to a depth of 30'. The individual must then meet the requirements outlined in Section 5.3, Continuation of Certificate. If a Scientific Diver wants to be certified to a deeper depth, he/she must

follow the guidelines provided in Section 5.4, Depth Certifications and Progression to Next Depth Level. The initial certification depth may be deeper than 30' if it is determined by the DSO that the Scientific Diver has appropriate qualifying experience and training.

5.3 Continuation of Certificate

5.3.1 *Minimum Activity to Maintain Certification*

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

5.3.2 *Requalification of Depth Certificate*

Once the initial certification requirements of Section 5.20 are met, divers whose depth certification has lapsed due to lack of activity may be re-qualified by procedures determined by the UNCW Diving Safety Office. At minimum, the diver will be required to complete a re-qualifying dive with the DSO, UNCW Divemaster, or other approved DSO representative before the individual can again be a fully certified Scientific Diver.

5.3.3 *Medical Examination*

All certified scientific divers shall pass a medical examination at the intervals specified in Section 6.10. After each major illness or injury, as described in Section 6.10, a certified scientific diver shall receive clearance to return to diving from a physician before resuming diving activities.

5.3.4 *Emergency Care Training*

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

a. Adult CPR (must be current with certifying organization)

b. Emergency oxygen administration (must be current with certifying organization)

c. First aid for diving accidents (must be current with certifying organization)

5.4 Depth Certifications and Progression to Next Depth Level

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

5.4.1 *Certification to 30 Foot Depth*

Initial permit level, approved upon the successful completion of training listed in Section 5.2.

5.4.2 *Certification to 60 Foot Depth*

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

5.4.3 *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.

5.4.4 *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.

5.4.5 *Certification to 150 Foot Depth*

A diver holding a 130 foot certificate may be certified to a depth of 150 feet after successfully completing, 4 dives to depths between 130 and 150 feet. The diver must also demonstrate knowledge of the special problems of deep diving, and of special safety requirements.

5.4.6 *Certification to 190 Foot Depth*

A diver holding a 150 foot certificate may be certified to a depth of 190 feet after successfully completing, 4 dives to depths between 150 and 190 feet. The diver must also demonstrate knowledge of the special problems of deep diving, and of special safety requirements. **Diving on air is not permitted beyond a depth of 190 feet.**

5.5 Certification Types

5.5.1 *Scientific Diver Certification*

a. This is a permit to dive, usable only while performing scientific diving activities.

b. A scientific diver from an AAUS organizational member institution can apply for permission to dive under UNCW auspices by submitting a Request for Diving Reciprocity Form (Appendix 1) to the UNCW DSO. This form must be signed by the DSO of the diver's home organization.

5.5.2 *Government Diver*

A person certified to dive through a federal government agency (e.g. NOAA, NASA, National Park Service) can apply for reciprocity to dive under UNCW auspices by submitting a Letter of Certification to Dive signed by the Director of the agency dive program, along with verification of current diving status and medical examination.

5.5.3 *Military Diver*

A person with military diver training and certification can apply for reciprocity by submitting diving certification documents, and a copy of a current diving physical examination.

5.5.4 *Other Diving Programs*

A scientific diver from a diving program not affiliated with AAUS, NOAA or the military, can apply for permission to dive under UNCW auspices. The DSO or Chairperson of the diver's home institutional DCB shall submit a document verifying the diver's training and experience (Letter of Certification to Dive) or use the Request for Diving Reciprocity (Appendix 1). Each form will be reviewed by the DSO to determine if diving reciprocity can be granted to the individual diver. If the DSO is unable to verify that the diver has sufficient training and experience for the planned diving

activities, then the individual will be required to participate in a Scientific Diver training program. In addition, the applicant must submit the following:

a. Copy of a current physical examination for diving (must meet AAUS medical standards)

b. Provide proof of basic diver certification (Photocopy of certification card)

c. Provide verification of diving experience (UNCW Diver Application, Appendix 10)

d. The diver must provide proof of at least 25 open water dives

e. Provide proof of current first aid and CPR certifications

f. Complete the UNCW Liability Release form (Appendix 11)

g. Complete the UNCW Scientific Diving Participant Information Form (Appendix 12)

h. Provide proof of current diving accident insurance such as DAN, PADI, or NAUI

5.5.5 *Temporary Diver Authorization*

A diver who is unable to meet any of the qualification options 5.5.1 – 5.5.4, but has demonstrated proficiency in diving, and can contribute measurably to the planned dive, will be required to participate in a diver qualification program and may receive temporary authorization to dive. This authorization is terminated upon expiration of physical examination, expiration of CPR, First Aid, or oxygen administration certification, or six months from last logged dive, whichever occurs first. Reauthorization will be considered on a calendar year basis. The diver shall comply with all other policies, regulations, and standards of this manual, including medical requirements which consist of the following:

a. Submit a copy of a current physical examination for diving (must meet or exceed the AAUS medical standards).

b. Provide proof of basic diver certification (Photocopy of C-Card).

c. Provide verification of diving experience (Diver Application, See Appendix 10).

d. The diver must have proof of at least twenty-five Openwater dives.

e. Provide proof of current CPR and First Aid Certifications.

f. Provide proof of oxygen administration training.

g. Complete a test of knowledge review (Diving written examination).

h. Perform a swimming evaluation (400 yard swim in less than 12 minutes, 25 yard underwater swim, and tread water for 10 minutes).

i. Perform an Openwater checkout dive.

5.5.6 *Guest Diver*

This permit constitutes a waiver of the requirements of Sections 4 and 5.1 - 5.4, 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 DSO, and for recreational type dives only. A Guest Diver Permit is normally

reserved for the press, VIPs and visiting scientists interested in short term participation in the University's scientific, operational, educational outreach or public relations programs.

A statement of the applicant's qualifications shall be documented as a part of the required dive plan. A Guest Diver Permit shall be restricted to the planned diving operation and, with exception to the requirements listed in Sections 4 and 5.1 – 5.4, shall comply with all other policies, regulations, and standards of this manual. Guest Diving will be conducted on a time/resource available basis only, and participation does not result in the issuance of a Scientific Diver certification.

a. Documentation requirements include completion and submission of the of the following to the DSO:
    1. UNCW Diver Application (Appendix 10).
    2. UNCW Guest Diver Application (Appendix 13)
    3. Provide proof of scuba diving certification by a recognized training organization (e.g. NAUI, PADI, NASDS, USN)
    4. Dive Logs which reflect recent open water diving activity (at a minimum, one dive within the past 4 months)
    5. Complete and sign a UNCW Release of Liability, Waiver of Claims, Assumption of Risk and Indemnification Agreement for Scientific Diving (Appendix 11)
    6. UNCW Participant Information Form (Appendix 12)
b. Requirements - With the exception of the requirements of Sections 4.0 and 5.1-5.4, diving will comply with all other policies, regulations, and standards of this manual and will also include the following:
    1. The maximum depth of the dive shall be commensurate with the diver's experience and certification level, but not to exceed 130 feet.
    2. The dives are to be conducted on compressed air or EANx within the USN no-decompression limits or follow a Center authorized dive computer for no-decompression dives.
    3. Guest divers must be accompanied by a UNCW DSO, Divemaster, or other approved DSO representative..
    4. The purpose of the dive is a recreational-type dive only. The Guest Diver may only participate as an observer.

5.5.7 *Divemaster*

The applicant for UNCW Divemaster certification must demonstrate to the DSO that he/she is sufficiently skilled and proficient to be certified as a Divemaster. This skill will be acknowledged by the DSO.

a. Prerequisites
    1. Possession of a depth certification equal to, or greater than, the planned depth of the divers he/she will be supervising.
    2. Certification by a nationally recognized diver certification agency at the advanced diver level or above, or completion of Divemaster training under the supervision of the DSO.

3. Current CPR, First Aid, and Oxygen Administration certifications.
4. A minimum of 100 logged dives, 25 at a depth of 60' or greater.

b. Training

1. Lecture or self-directed study of the following five subject areas: dive planning, diving equipment, air and nitrox decompression tables, diving accident management, and UNCW diving regulations and procedures.
2. Pool instruction covering practical aspects of skin and SCUBA diving, diving rescue, and diving accident management.
3. Evaluation of the candidate, by the DSO, while performing Divemaster duties.

c. Examinations

1 Pass a written examination coving the five subject areas in 5.7 b. 1.

2 Demonstrate the ability to perform skin and SCUBA diving skills, diver rescues, and use an oxygen resuscitator.

3 Demonstrate the ability to safely conduct diving operations according to UNCW diving regulations and procedures.

d. Terms of certification and recertification

1. Divemaster certifications will be reviewed every two years from the date of certification by the DSO.
2. During any 12-month period, each Divemaster must supervise a minimum of four open water SCUBA dives. Failure to meet the above requirement may be cause for revocation or restriction of certification.
3. If a Divemaster's certification expires or is revoked, he/she may be recertified after complying with such conditions as the DSO or the UNCW Diving Control Board may impose. The diver will be given an opportunity to present his/her case before conditions for recertification are stipulated.

5.6 Revocation of Certification

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

5.7 Recertification

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

6 Medical Standards

6.1 General Policy

a. The DSO shall determine that dive team members who will be exposed to hyperbaric conditions 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. UNCW will provide Faculty and Staff divers with all medical examinations required by this standard.

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. (see Section 6.5)

6.2 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 age 60), the University has obtained the results of that examination, and those results have been reviewed and found satisfactory.

b. Thereafter, at 5 year intervals up to age 40, every 3 years after age 40, and every 2 years after age 60, from the date of initial evaluation or last equivalent evaluation.

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.

6.3 Information Provided to Examining Physician

UNCW shall provide a copy of the medical evaluation requirements of this standard to the examining physician. (Appendices 14-16).

6.4 Content of Medical Evaluation

Medical examinations conducted initially and at the intervals specified in section 6.2 shall consist of the following:

a. Medical Evaluation of Fitness for Scuba Diving and Release of Medical Information to the Diving Safety Officer and the DCB (See Appendix 15).

b. Medical History (See Appendix 16)

c. Diving physical examination (Section 4.2.4 and Appendices 15 and 16).

6.4 Disqualifying Conditions

The following list, though not comprehensive, provides known conditions for which restriction from diving is recommended (Adapted from Bove, 1998). Divers and diver applicants should consult with their physician to determine if they have a condition which may disqualify them from diving.

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

6.5 Laboratory Requirements for Diving Medical Examinations

6.5.1 *Every examination*

a. Medical History
b. Complete Physical Exam, emphasis on neurological and otological components
c. Urinalysis
d. CBC and Chem panel
e. Chest X-Ray (PA & Lateral)
f. Resting EKG
g. Pulmonary Function Test (PFT)
h. Audiogram
i. Pre and Post Exercise PFT with Albuterol (for anyone with history of smoking, asthma, COPD, Reactive Airway Disease, or any other pulmonary limiting problem)
j. Cardiac Stress Test (for anyone with known Carotid Artery Disease or with multiple risk factors for Carotid Artery Disease[1])
k. Any further tests deemed necessary by the physician

6.5.2 *Dive Physical Frequency*

Every 5 years if under age 40

Every 3 years if age 40-59

Every 2 years if age 60 or over

6.6 Physicians Written Report

After any medical examination relating to the individual's fitness to dive, the Diving Safety Office shall obtain a written report prepared by the examining physician, which shall contain the examining physician's opinion of the individual's fitness to dive, including any recommended restrictions or limitations. This will be reviewed by the DSO, who shall recommend whether the individual should be certified unconditionally, be certified as a "Restricted Activity Diver", be required to undergo further testing, or be rejected.

The Diving Safety Office shall, upon request, provide the individual with a copy of the physician's written report.

[1] "Assessment of Cardiovascular Risk by Use of Multiple-Risk-Factor Assessment Equations." Grundy et. al. 1999. AHA/ACC Scientific Statement. **http://circ.ahajournals.org/cgi/reprint/circulationaha;100/13/1481**

7 Nitrox Diving Guidelines

7.1 Overview

Enriched Air Nitrox (EANx or Nitrox) for diving is a breathing gas mixture composed predominately of nitrogen and oxygen, with an oxygen percentage greater than air (>21%). Nitrox should be considered when increased bottom time or decreased nitrogen narcosis are desirable. Personnel shall be trained and certified to perform Nitrox SCUBA dives prior to use.

7.2 Eligibility

Certified Scientific Divers, Scientific Diver Candidates (Section 5.00) and Guest Divers diving under the auspices of UNCW or another AAUS member organization are eligible for authorization to use Nitrox. After completion of training and qualification, an applicant will be authorized to use nitrox within their depth authorization, as specified in Section 5.4.

7.3 Authorization to Use Nitrox

The Scientific Diver or Scientific Diver Candidate must complete additional classroom instruction and practical training prior to authorization to use Nitrox. Submission of a request to complete Nitrox training and participate in aptitude examinations does not automatically result in certification as a Nitrox Diver. The candidate must convince the DSO that he/she is sufficiently skilled and proficient to be certified as a Nitrox diver. The skills will be acknowledged by the signature of the DSO on the certification form, which will be placed in the divers file. Any applicant who does not possess the necessary judgment or proficiency after completing training may be denied Nitrox diving certification.

7.4 Required Training

The diver must complete additional theoretical and practical training beyond the Scientific Diver, compressed air certification or equivalent level. Prior to authorization to use Nitrox, the following minimum requirements should be met:

7.4.1 *Classroom Instruction*

a. Topics should include, but not be 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.

b. The DSO 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.

7.4.2 *Practical Training*

The practical training portion will consist of a review of skills as stated for scuba (Section 5.0), with additional training as follows:

a. Oxygen analysis of nitrox mixtures
b. Determination of MOD, oxygen partial pressure exposure, and oxygen toxicity time limits, for various nitrox mixtures at various depths
c. Determination of nitrogen-based dive limits status by EAD method using air dive tables, or using nitrox dive tables, as approved by the DSO
d. Nitrox dive computer use
e. A supervised openwater dive using Nitrox may be required. If the MOD for the mix being used can be exceeded at the training location, direct, in-water supervision is required.

7.4.3 *Written Examination (based on classroom instruction and practical training)*

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

a. Function, care, use, and maintenance of equipment cleaned for nitrox use
b. Physical and physiological considerations of nitrox diving (ex.: O2 toxicity)
c. Diving regulations and procedures as related to nitrox diving, either scuba or surface-supplied (depending on intended mode)
d. Given the proper information, calculation of:
    1. EAD for a given fO2 and actual depth
    2. pO2 exposure for a given fO2 and depth
    3. Optimal Nitrox mixture for a given pO2 exposure limit and planned depth
    4. Maximum operational depth (MOD) for a given mix and pO2 exposure limit
e. Dive table and dive computer selection and usage
f. Nitrox production methods and considerations
g. Oxygen analysis
h. Nitrox operational guidelines (Section 7.40), dive planning, and dive station components

7.5 Scientific Diving Regulations for Nitrox

7.5.1 *Minimum Activity*

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

7.5.2 *Dive Personnel Requirements*

a. Scientific Diver: A Scientific Diver who has completed the requirements of Section 5.00 and the training and authorization sections of these guidelines, may be authorized by the UNCW Diving Safety Office to use Nitrox. Depth authorization to use Nitrox should be the same as those specified in the diver's authorization, as described in Section. 5.40.
b. Lead Diver/Divemaster: On any dive during which Nitrox will be used by any team member, the Lead Diver/Divemaster should be authorized to use Nitrox, and hold appropriate authorizations required for the dive, as specified in these standards. Authorization by the

DSO for Nitrox dives by Lead Diver/Divemaster should occur as part of the dive plan approval process.

1. In addition to responsibilities listed in Section 1.5.6, the Lead Diver should, as part of the dive planning process and pre-dive procedures:
    i. Verify that all divers using nitrox on a dive are properly qualified and authorized.
    ii. 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.
    iii. Reduce the maximum allowable pO2 exposure limit for the dive team if on-site conditions or work load requirements so indicate.

7.5.2 *Dive Parameters*

a. Oxygen Exposure Limits
    1. The inspired oxygen partial pressure experienced at depth should not exceed 1.6 ATA. All dives performed using nitrox breathing mixtures should comply with the current NOAA Diving Manual “Oxygen Partial Pressure Limits for ‘Normal’ Exposures”.
    2. The maximum allowable exposure limit should be reduced in cases where cold or strenuous dive conditions, or extended exposure times are expected. The DSO 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.
    3. If using the equivalent air depth (EAD) method the maximum depth of a dive should be based on the oxygen partial pressure for the specific nitrox breathing mix to be used.

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

c. Dive Tables and Gases
    1. A set of Nitrox dive tables approved by the UNCW Diving Safety Office should be available at the dive site.
    2. When using the EAD method, dives should be conducted using air dive tables approved by the UNCW Diving Safety Office.
    3. If Nitrox is used to increase the safety margin of air-based dive tables, the MOD and oxygen exposure and time limits for the Nitrox mixture being dived should not be exceeded.
    4. Breathing mixtures used while performing in-water decompression, or for bail-out purposes, should contain the same or greater oxygen content as that being used

during the dive, within the confines of depth limitations and oxygen partial pressure limits set forth in Section 7.5.2, Oxygen Exposure Limits.

d. Nitrox Dive Computers

1. Dive computers may be used to compute decompression status during Nitrox dives. Manufacturers' guidelines and operations instructions should be followed.
2. Use of Nitrox dive computers should comply with dive computer guidelines included in the AAUS Standards.
3. Nitrox dive computer users should demonstrate a clear understanding of the display, operations, and manipulation of the unit being used for Nitrox diving prior to using the computer, to the satisfaction of the DSO or designee.
4. If Nitrox is used to increase the safety margin of an air-based dive computer, the MOD and oxygen exposure and time limits for the nitrox mixture being dived should not be exceeded.
5. Dive computers capable of 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.

e. Repetitive Diving

1. Repetitive dives using Nitrox mixtures should be performed in compliance with procedures required of the specific dive tables used.
2. Residual nitrogen time should be based on the EAD for the specific Nitrox mixture to be used on the repetitive dive, and not that of the previous dive.
3. The total cumulative exposure (bottom time) to a partial pressure of oxygen in a given 24 hour period should not exceed the current NOAA Diving Manual 24-hour Oxygen Partial Pressure Limits for "Normal" Exposures.
4. When repetitive dives expose divers to different oxygen partial pressures from dive to dive, divers should account for accumulated oxygen exposure from previous dives when determining acceptable exposures for repetitive dives. Both acute (CNS) and chronic (pulmonary) oxygen toxicity concerns should be addressed.

7.5.3 *Gas Analysis*

a. All enriched air breathing mixtures to be used shall be analyzed by the individual diver, prior to use, using an oxygen analyzer.

b. Prior to starting the dive, it is the responsibility of each diver to confirm and verify in writing on the dive log:

1. the oxygen content of his/her SCUBA cylinder and the cylinder number
2. PO_2 cut off depth and appropriate Nitrox mixture to be use on the dive
3. The planned maximum depth and allowable bottom time permitted for the mixture contained in his/her SCUBA cylinder

c. It is the responsibility of the Divemaster or the Lead Diver to verify, in writing on the dive log, the oxygen content of all SCUBA cylinders prior to commencing diving operations.

d. Oxygen content will be:

a. ± ½% for EANx Repetitive Diving Tables using the EAD concept

b. ± 1% for NNI and NNII tables

c. ± ½% for Nitrox dive computers

7.6 Nitrox Diving Equipment

All of the designated equipment and stated requirements regarding SCUBA equipment as listed in Section 3 - Diving Equipment, should apply to Nitrox SCUBA operations. Additional minimal equipment necessary for nitrox diving operations includes labeled SCUBA Cylinders and Oxygen Analyzers.

7.6.1 *Oxygen Analyzer*

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.

7.6.2 *SCUBA Cylinder Identification and Marking*

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

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

b. 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.

c. 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.

d. Other markings, which identify the cylinder as containing gas mixes other than Air, may be used with the approval of the DSO.

e. A contents label should be affixed, to include the current oxygen percentage, date of analysis, and MOD.

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

7.6.3 *Additional Requirements for Oxygen Service*

a. 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.

b. Equipment used with oxygen or mixtures containing over 40% by volume oxygen shall be designed and maintained for oxygen service. 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. Oxygen systems over 125 psig shall have slow-opening supply valves.

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

d. All diver and support equipment should be suitable for the oxygen percentage being used.

7.7 Nitrox Quality Standards

7.7.1 *Authorized Mixtures*

Mixtures meeting the criteria outlined in Section 7.40 may be used for Nitrox diving operations, upon approval of the DSO

7.7.2 *Compressor Systems and Operation*

a. Compressor/filtration system must produce oil-free air.

b. An oil-lubricated compressor placed in service for a Nitrox system should be checked for oil and hydrocarbon contamination at least quarterly.

c. 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.

7.7.3 *Purity*

Oxygen used for mixing nitrox-breathing gas should meet the purity levels for “Medical Grade” (U.S.P.) or “Aviator Grade” standards.

a. In addition to the Air Purity Guidelines (Section 3.6), the following Air Purity standards 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.

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

7.7.4 *Non-University Controlled Sources*

Nitrox from commercial sources approved by University authorities shall be certified by the supplier as suitable for breathing, according to specifications in Sections 3.6 and 7.7 of this manual.

8 Single Stage Decompression Diving

8.1 Overview

No diver shall plan or conduct staged decompression dives without prior approval of the DSO. Approval of dive plans to conduct required decompression dives shall be on a case-by-case basis.

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

The following procedures shall be observed when conducting dives requiring a planned decompression stop.

8.2 Qualification Criteria for Single Stage Decompression Diving

Single stage decompression diving, using air or appropriate Nitrox mixture, will be reviewed as part of the Dive Plan and will only be used in exceptional circumstances when meeting the following requirements:

a. Personnel are certified for decompression or extended range decompression diving.
b. Tasks to be completed are essential for successful completion of the mission and either time or depth objectives can benefit significantly from the use of decompression or extended range diving techniques.

8.3 Prerequisites for Single Stage Decompression Diving

a. Scientific Diver qualification according to Section 5 of this manual.
b. Minimum of 50 logged dives with a minimum of 5 logged dives deeper than 100'.
c. Demonstration of the ability to safely plan and conduct dives deeper than 100'.
d. Nitrox certification/authorization according to Section 7 of this manual

8.4 Training Requirements for Single Stage Decompression Diving

Individuals performing research using decompression diving techniques to a maximum of 150' will be required to complete the following training program.

8.4.1 *Classroom theory*

a. Direct effects of pressure
b. Indirect effects of pressure
c. Decompression theory
d. Oxygen toxicity
e. Partial pressure and oxygen limits
f. Inert gas narcosis
g. Role of carbon dioxide
h. Decompression tables

i. Decompression diving equipment
j. Dive planning and gas management
k. Decompression procedures and safety requirements

8.4.2 *Pool/Confined Open Water*

a. Equipment familiarization
b. Safety drills
c. Emergency dive procedure practice

8.4.3 *Open Water Dives*

Four training dives with an aggregate of 100 minutes of bottom time are required. Divers will be accompanied by a DSO (student/instructor ratio no more than 4:1) and include three simulated and one actual decompression dive, with two of the four dives between 100' and 150'. Over the course of the four open water dives, the following skills will be evaluated by the DSO:

a. Equipment manipulation
b. Buoyancy control
c. Lift bag/line reel deployment
d. Proper ascent rate
e. Execution of decompression stop
f. Gas management
g. Task management
h. Emergency dive procedures practice
i. Accurate reporting of maximum depth and bottom time
j. Ability to plan and execute decompression dives safely
k. Demonstrate acceptable navigation/orientation skills
l. Proper buddy skills

8.4.4 *Written examination*

Candidates must demonstrate knowledge in classroom theory and practical skills as related to single stage decompression diving. A passing score on the written exam is 80%.

8.4.5 *Additional Training Requirement*

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

8.5 Diving Standards for Single Stage Decompression Diving

Diving standards shall comply with guidelines outlined in Section 2 -Diving Regulations for SCUBA (Open Circuit, Compressed Air) with the following exceptions/additions:

8.5.1 *Maximum Depth*

The maximum depth for single stage decompression diving techniques shall be 150'.

8.5.2 *Dive Planning and Diver Requirements*

a. All decompression dives shall be thoroughly planned and organized prior to execution of the dive, including assigned tasks, planned bottom time, decompression stop, ascent procedures, and contingency plans.

b. A maximum of six divers are allowed in the water at the same time.

c. In-water standby diver(s) may be used to confirm bottom time, depth profile, and adequacy of gas supply when divers arrive at their scheduled stop(s). Standby diver(s) may also relieve divers of scientific equipment, samples, and tools.

8.5.3 *Minimum Operational Requirements*

a. The maximum pO_2 to be used for planning required decompression dives is 1.6. It is recommended that a pO_2 of less than 1.6 be used during bottom exposure.

b. Divers gas supplies shall be adequate to meet planned operational requirements and foreseeable emergency situations.

c. Decompression dives may be planned using dive tables, dive computers, or PC software approved by the DSO.

d. Breathing gases used while performing in-water decompression shall contain the same or greater oxygen content as that used during the bottom phase of the dive.

e. Prior to each dive the dive team shall review emergency procedures appropriate for the planned dive.

f. If breathing gas mixtures other than air are used for required decompression, their use shall be in accordance with those regulations set forth in the appropriate sections of this standard.

g. Mission specific workup dives are recommended.

8.6 Minimum Equipment Requirements for Single Stage Decompression Diving

8.6.1 *SCUBA equipment*

All equipment listed in Section 3 – Diving Equipment is required for Single Stage Decompression Diving.

8.6.2 *Additional Equipment Requirements*

a. Divers shall carry sufficient gas supply to allow completion for planned bottom time and decompression requirements, incorporating the correct gas management rules. Gas supply will have a dual outlet supply with two first stages and two second stages. One second stage shall have a 40-inch hose.

b. Divers shall carry two line reels and two 50 lb lift bags, slate & pencil, knife or medical scissors located on upper body or attached to BC, calibrated depth gauge, and a means of monitoring bottom time and rate of ascent, and submersible decompression tables.

c. Compass

8.6 Extended Range/Multi-Stage Decompression Diving

Multi-stage decompression diving is inclusive of deep air and Tri-mix dive operations planned for greater than 150'. The *UNCW Standards and Procedures in the Use of Technical Diving in Scientific Research* (March 2004) shall be used for all diver training and certification, as well as to govern all extended range/multi-stage decompression activities conducted under the auspices of UNCW.

9 Other Diving Technology

Certain types of diving, some of which are listed below, require equipment or procedures that involve additional training beyond the Scientific Diver Certification. In those cases, the DSO will work with the Principle Investigator to develop the additional training and procedures required to accomplish their underwater objectives. Any non-standard procedures must be approved by the DCB prior to implementation.

9.1 Blue Water Diving

Blue water diving is defined as diving in open water where the bottom is generally greater than 200' deep. It requires special training and the use of multiple-tethered diving techniques. Specific guidelines that should be followed are outlined in "Scientific Blue Water Diving" (California Sea Grant Publ. No. SG017).

9.2 Ice and Polar Diving

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

9.3 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 wire. The standard hookah equipment currently in use by UNCW personnel consists simply of a long hose attached to a standard SCUBA cylinder supplying a standard SCUBA second stage regulator in very shallow (<10') water. The diver is responsible for monitoring his/her depth, time, and diving profile. The vessel captain is responsible for monitoring SCUBA cylinder pressure.

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

Diver:_____ Date:_____

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

The following is a brief summary of this diver's personnel file as of _____
(Date)

_____ Original diving authorization

_____ Written scientific diving examination

_____ Last diving medical examination Medical examination expiration date_____

_____ Most recent checkout dive

_____ Scuba regulator/equipment service/test

_____ CPR training (Agency) _____ CPR Exp. _____

_____ Oxygen administration (Agency) _____ 02 Exp. _____

_____ First aid for diving _____ F.A. Exp. _____

_____ Date of last dive _____ Depth

Number of dives completed within previous 12 months? _____ Depth Certification _____ fsw

Total number of career dives? _____

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

Please indicate any pertinent specialty certifications or training:

Emergency Information:

Name: Relationship:

Telephone (work): (home/cell):

Address:

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

Diving Safety Officer:

_____ _____
(Printed Name & Signature) (Date)

UNCW DIVE PLAN

Project: _____ Dates: _____

Project PI: _____ Lead Diver/Dive Master: _____

Purpose (check one): ☐ Scientific ☐ Training ☐ Recreational

Mode (check one): ☐ SCUBA ☐ Other: _____

Breathing Gas: ☐ Air ☐ Nitrox (mix % _____) ☐ Other: _____

Dive Site(s): _____

_____

Approximate Number of Dives: _____

Anticipated Maximum Depth(s) & Bottom Time(s): _____

Participating Scientific Divers and their depth limits. If the divers are not all diving the same breathing gas, specify gas to be used.

Diver Name	Depth Limit	Nitrox/Air/Trimix
Lead/Divemaster 1.		
2.		
3.		
4.		
5.		
6.		
7.		

(list additional divers at the bottom or on the back of this page)

Summary of Proposed Work (List tools, equipment, & boats to be employed, and a general description of site conditions):

List any hazards anticipated: _____

_____

Emergency Plan: Lead Diver must ensure that oxygen unit, first aid kit and radio or cell phone are on-site.

Required Medical Facility Information (List location, telephone number and, if prudent, detailed directions):

Nearest Hospital: _____

Method of Transportation: _____

Nearest Recompression Chamber: _____

Call: Divers Alert Network: (919) 684-8111 **DSO Phone: (910) 520-5243**

Equipment or Support Requested from the Diving Safety Office:

Participating Scientific Divers and their Emergency Information:

Diver Name	Emergency Phone	Contact Person	Relationship
1. Lead/Divemaster			
2.			
3.			
4.			
5.			
6.			
7.			

(list additional divers at the bottom or on the back of this page)

Submitted By: _____

Date: _____ Phone Number: _____

UNCW DSO Approval: _____ Date: _____

Live Boating Procedures[1]

Purpose:
This summary is intended to provide basic instruction for boat operators and dive masters when working in support of dive operations. Standard dive tending practices are included as well as specific instructions for safe operations when maneuvering vessels in close proximity to divers in the water.

Definition:

Live Boating – maintaining a mobile vessel in support of dive operations. This method of dive tending is preferred in instances where anchoring is difficult, under conditions with high currents, when the dive plan makes it likely that divers will move away from the initial dive location, and in locations where divers may need to be shielded from other vessel traffic.

Operator Qualifications:

Live boating requires exceptional boat handling skills and situational awareness. Qualified operators must demonstrate good close quarters maneuvering skills and be able to communicate and navigate effectively. Previous dive experience is highly recommended. Novice operators will work in the company of more experienced personnel until the necessary skills have been developed.

General Guidelines

Dockside:

- Verify that all required and recommended equipment is on board before getting underway, including emergency O2 kit, first aid kit, and phone numbers for DAN and the local recompression chamber.
- Review dive plan with all participants. Make sure everyone understands the plan before leaving the dock. This includes the dive emergency procedure, lost buddy procedure, diver recall signal (series of 3 short engine revs, repeated 3 times – repeat sequence if there is no diver response), and expected maximum time, depth and distance/direction of travel. Have the dive log available for boat operator/dive master to keep tack of dive data.
- Stow gear securely and monitor equipment while in transit. Keep deck as clear as possible.

[1] Adopted from the document written by John Douglas and Diana Steller

On station:

- Scan area for potential hazards such as boat traffic, or dangerous marine life. Note the rate of drift or other signs of strong current.
- Evaluate sea state/weather conditions. Determine if local conditions are likely to change during the period of the dive.

- **Put up the dive flag.**
- Assist divers donning gear as needed. Be prepared to hand equipment over the side once divers are in the water.
- **If for any reason (rough seas, poor visibility) tracking the diver's bubbles will be foreseen as difficult, one of the divers is required to carry a safety sausage or other brightly colored surface float with enough line to reach the surface for tracking by the vessel captain.**

Before deploying divers:

- Confirm that all divers are ready to enter the water.
- Direct the divers to position themselves at the designated exit ready to deploy.
- In areas of strong wind and/or current, the vessel should be positioned up current from the drop location so they do not have to swim against the current before descending.
- Be certain the boat is not in a position to drift back down over the divers and that the divers will be exiting on the up current side of the boat
- **Make sure the engine is idling in neutral. The captain will confirm this by stating "neutral" prior to diver deployment.**
- The captain or dive master will give the divers permission to deploy off the boat by stating " dive, dive, dive". All divers need to enter the water as a group to avoid getting separated at the surface.
- Once divers are clear of the boat, floating at the surface, and have given the surface OK signal (one hand on top of the head) it is safe to engage the engine and move a short distance (25-50') away. **Note your current location by GPS.**

During the dive:

- Mark time on dive log when divers begin their descent.
- **Dive tending during live boating operations requires singular focus. Do not attempt any other sampling or instrument deployments that could distract the operator or make recovering divers difficult.**
- Keep the boat down weather (wind and/or current) from the drop location if possible. The sun should be behind you for best visibility and the wind should be in your face.
- **Keep bubbles in sight at all times.** Wind chop and glare can make this difficult, so it is important to minimize distractions and stay focused on the divers. It may be preferable to position the boat parallel to the diver's bubbles if they are moving with a current.
- Monitor VHF radio and continue to scan for hazards.
- Keep any approaching vessels at least 100' away from divers. It may be appropriate to issue a "Securite" (say-curitay) warning on VHF channel 16 to inform other boaters of your activity. You may also use the VHF radio to hail

specific vessels on approach. Sound the danger/doubt signal (5 short blasts) if necessary and/or use hand gestures to divert an approaching vessel.
- Diver recall – if a situation arises that requires a recall, employ the previously discussed plan.
- If you lose track of the bubbles during the course of the dive, it is important to maintain your current position (or course and speed if transecting) and continue scanning. Enlist assistance from other crew members and stay calm. Send someone aloft if possible. Take note of the time relative to expected dive duration and consider recalling the divers. If planned dive duration has been exceeded and multiple recall attempts are unsuccessful it may be necessary to summon aid by radio or cell phone. Continue scanning downwind/downcurrent until divers are located.
- Divers should carry an inflatable safety sausage or other float and a sound-making device in the event they cannot see the boat when they surface.

Recovering divers:

- Record time of surfacing in the dive log. Look for OK from divers and verify that all team members are present. Signal the divers to let them know that you see them.
- Divers should stay together as a group around the surface buoy.
- Approach divers by heading into the wind or current. Aproach slowly, using only enough speed to maintain steerage and keep divers up current relative to the vessel. **Do not allow the boat to be blown/drift over divers at the surface!**
- Shift to neutral at least one boat length from divers and allow the boat to drift to within easy swimming distance. The captain will confirm that the engine(s) are in neutral and call out “neutral”. The divers are than signaled that it is safe to approach the vessel.
- In some cases it may be helpful to use a floating line trailing behind the boat for divers to grab onto. Short tag lines (with end clips) secured to the rail are also helpful for retrieving gear from the divers prior to boarding.
- Verify physical condition of all participants and monitor thereafter for any signs of decompression illness (DCI)
- Take down the dive flag and stow gear for transit back to shore.

Upon returning dockside:

- Close out float plan
- Rinse all equipment with freshwater prior to storage.
- Report any lost, damaged, or malfunctioning equipment to the DSO or other appropriate personnel.
- Turn in completed dive log to the DSO.

DIVE COMPUTER GUIDELINES

1. Any diver who plans to use a dive computer as a means of determining decompression status must complete an appropriate practical training session and demonstrate correct set-up and operational knowledge prior to use.

2. Each diver relying on a dive computer to plan dives and indicate or determine decompression status must have his/her own unit.

3. On any given dive, both divers in the buddy pair must follow the most conservative dive computer.

4. If the dive computer fails at any time during the dive, the dive must be terminated and appropriate surfacing procedures initiated immediately unless the diver has backup tables readily available.

5. A diver should not dive for 18 hours before activating a dive computer to use it to control their diving.

6. Once the dive computer is in use, it must not be switched off until it indicates complete off-gassing has occurred or 18 hours have elapsed, whichever comes first.

7. 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.

8. Whenever practical, divers using a dive computer should make a stop between 10 and 20 feet for 3- 5 minutes, especially for dives below 60 fsw.

9. Multiple deep dives require special consideration. Redundant computers on each diver are strongly recommended.

UNCW SCIENTIFIC DIVING LOG

DATE:_____ Page _____of_____

LOCATION: _____ POSITION LAT.: _____ LONG: _____ P.I.: _____

LEAD DIVER: _____ PLATFORM: _____

Dive No.	Diver's Name (Last, First)	Surf Interv. (hr:min)	Rept. Grp RNT	N_2O_2 %	Planned Depth	Planned B.T.	PPO_2 Cutoff Depth	Cylinder Pressure	Comp. (Yes_√_)	Time Down	Time Up	Actual Dive Stats Depth	Actual Dive Stats B.T.	Rept. Group Out
								In: / **Out:**						
								In: / **Out:**						
								In: / **Out:**						
								In: / **Out:**						
								In: / **Out:**						
								In: / **Out:**						
								In: / **Out:**						
								In: / **Out:**						
								In: / **Out:**						
								In: / **Out:**						
								In: / **Out:**						
								In: / **Out:**						
								In: / **Out:**						

Nitrox Cylinder Sign-Off

Diver's Name	Tank#	$\%O_2$	Initials DV	Initials DM	Tank #	$\%O_2$	Initials DV	Initials DM	Tank #	$\%O_2$	Initials DV	Initials DM
1.												
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												

Dive Conditions:

Wind (knots) _____

Sea State (feet) _____

Air Temp. °F _____

Water Temp. °F _____

Visibility (feet) _____

Current (knots) _____

Bottom Type _____

Other _____

Special Dive Equipment:

Dry Suits _____

Dive Computer _____

Full Face Mask SCUBA _____

Enriched Air _____

U/W Communications _____

Umbilical Supplied _____

Photography _____

Video _____

Other _____

Tasks:

UNCW Diving Accident Management Procedures

Introduction

A diving accident victim could be any person who has been breathing compressed gas under water regardless of depth. It is essential that emergency procedures are predetermined on the UNCW Dive Plan (Appendix 2) and that medical treatment is initiated as soon as possible. It is the responsibility of the Divemaster or Lead Diver to develop procedures for diving emergencies including evacuation and medical treatment for each dive location.

General Procedures

Depending on the nature of the diving accident, stabilize the patient, administer 100% oxygen, and contact local Emergency Medical Services (EMS) for transport to medical facility. Contact the UNCW DSO, as soon as appropriate. Explain the circumstances of the dive incident to the evacuation teams, medics and physicians. Do not assume that they understand why 100% oxygen may be required for the diving accident victim or that recompression treatment may be necessary.

1. Make appropriate contact with victim or rescue as required, followed by injured diver assessment.
2. Stabilize the injured diver.
3. Establish (A)irway, (B)reathing, (C)irculation as required.
4. Administer 100% oxygen.
5. Notify the local EMS or US Coast Guard for transport to nearest medical treatment facility. Explain the circumstances of the dive incident to the evacuation teams, medics and physicians.
6. If necessary contact Diver's Alert Network (DAN) for the location of the nearest operational recompression facility.
7. Notify the UNCW DSO of any diving related emergency. If unable to reach the DSO, contact the CMS Assistant Director of Marine Operations or the UNCW Environmental Health and Safety Office to report the emergency. Contact names and phone numbers are listed in the Diving Accident Management Plan.
8. Secure injured diver's scuba equipment and turn over to Lead Diver or Divemaster.
9. Complete and submit Accident Report through the DSO.

List of Emergency Contact Numbers Appropriate For Dive Location:

Emergency Contact Numbers:

UNCW DSO: (910) 520-5243

UNCW Environmental Health and Safety: (910) 279-7585

UNCW Director of Marine Operations: (910) 279-4686

Divers Alert Network Emergency Number: (919) 684-9111

08.450 WORKER'S COMPENSATION, ACCIDENT REPORTING AND OSHA RECORDKEEPING

Authority:	Chancellor
History:	Revised January 22, 2007; supersedes former Policy No. HR 5.10 effective July 24, 1995
Source of Authority:	N.C. Gen. Stat. Chapter 97; UNC Policy 300.8.3[G]
Related Links:	State Government Workers Compensation Program; UNCW Environmental Health & Safety Forms: http://www.uncw.edu/hr/forms.html
Responsible Office:	Human Resources

I. Purpose

Explains university policies and procedures concerning workers' compensation claims filed against The University of North Carolina at Wilmington and the reporting of workplace injuries and illnesses.

II. Scope

Applies to all university employees regardless of status or type of appointment. Student employees who are injured in the course of their employment are also covered by this procedure. Volunteers are not covered by this procedure.

III. Policy

All employees of the university are covered by the North Carolina Workers' Compensation Act, including part-time, temporary and student workers. Any employee who suffers an accidental injury arising out of and in the course of employment or who contracts an occupational disease within the meaning of the Workers' Compensation Act is entitled to medical attention at the expense of the university. If applicable, the injured employee is also entitled to disability compensation, including a weekly compensation benefit for time lost from work.

A. Coordination with Other Agencies

1. North Carolina Industrial Commission

This agency establishes the rules and regulations under which the Workers' Compensation Act is administered. Determination of liability and all bills for payment as a result of the injury will be processed according to these rules and regulations. In cases where the university and the injured employee

cannot agree on liability or compensation, the Commission will hold hearings.

2. North Carolina Department of Labor - OSHA Recordability Requirements

   Workplace injuries and illnesses that may qualify under the Occupational Safety & Health Administration may or may not be qualified as Workers' Compensation. With the assistance of Human Resources and the reporting department, Environmental Health & Safety will determine the accident status for OSHA recordkeeping.

3. Third-Party Administrator

   The State of North Carolina has contracted a third-party administrator to handle Workers' Compensation claims. The third-party administrator is responsible for determination of liability, authorization of treatment, bill processing, weekly compensation benefits, and forms filing. Contact Human Resources for the name and telephone number of the current third-party administrator and the university's adjuster.

B. Reporting Requirements

All work-related injuries or illness must be reported immediately (or as soon as possible) to the employee's supervisor/department head by the employee or his/her representative. Delay in reporting job injuries or illness may result in the loss of benefits.

To ensure the timely payment of benefits, the employee is required to provide written notice of the accident/injury to Human Resources within five days of occurrence of the accident/injury. To fulfill this requirement, the employee should complete the "Employee Statement for Work-Related Injury." (See Procedure statement 1.)

No compensation shall be payable unless written notice is given to the university by the employee (or his/her representative) within 30 days after occurrence of the accident or death, unless reasonable excuse is made to the satisfaction of the Industrial Commission for not giving such notice and the Commission is satisfied that the employer has not been prejudiced thereby.

1. Reporting by the Supervisor/Department Head

   All work-related injuries or illnesses must be reported to the Environmental Health and Safety Department (910-962-3108) and Human Resources (910-962-3160) immediately. Additionally, any hazardous working conditions that may have contributed to the accident must be reported immediately to the Director of Environmental Health and Safety and to the employee's supervisor so that arrangements for investigation and correction can be made.

Within 24 hours of knowledge of the injury, the supervisor/department head must complete the Supervisor's Accident Report and submit the completed report to the Workers' Compensation Administrator in Human Resources and the Director of Environmental Health & Safety.

2. Reporting to North Carolina Industrial Commission

The university is required by law to provide a written report to the North Carolina Industrial Commission within five days from knowledge of any injury that results in more than one day's absence from work or if medical expenses exceed an amount determined by the North Carolina Industrial Commission. Responsibility for reporting to the North Carolina Industrial Commission rests with the Third-Party Administrator.

3. Reporting to the North Carolina Occupational Health and Safety Administration and OSHA Recordability

If an accident results in the death of one or more employees and/or hospitalization of three or more employees, the supervisor/department head must immediately notify Environmental Health & Safety or if after business hours, advise University Police to contact Environmental Health & Safety immediately. Additionally, all fatal heart attacks occurring in the workplace, whether or not work-related, must be reported to Environmental Health & Safety immediately.

The Environmental Health & Safety OSHA Record keeper must determine recordability and log the injury/illness within seven (7) days of occurrence. The supervisor/department head must report all lost and restricted work activity days resulting from the injury/illness to the Environmental Health & Safety Department.

C. Investigation Responsibility

1. All accidents are to be investigated immediately by the employee's supervisor/department head.
2. Serious accidents are to be further investigated by an investigative team that should include the employee's supervisor and the Director of Environmental Health and Safety.

D. Claims for Compensation

Responsibility for claiming compensation rests on the injured employee. The employee, through the university, must file a claim with the North Carolina Industrial Commission within two years from the date of injury or knowledge thereof. Otherwise, law bars the claim.

IV. Procedure

A. Appropriate Medical Attention

Employees are required to seek treatment for work-related injuries from the university's approved medical providers. The supervisor should arrange appropriate medical attention as indicated below. Employees who refuse medical treatment should sign a statement acknowledging that medical treatment was offered and refused.

Life-Threatening Injury Call University Police (4911).

Serious Injury Employee should be taken to Cape Fear Hospital Emergency Room (Telephone: 452-8112). Call University Police (4911) for emergency transportation.

Non Life-Threatening Injury Employee should be taken to MEDAC II, 1442 Military Cutoff Road, 8AM-8PM, 7 days a week (256-6088).

B. Employee's Statement for Work-Related Injury

After the injured employee has completed the "Employee Statement," the form will be given to the employee's supervisor/department head. The supervisor will investigate the accident and verify the employee's statement or submit an attached statement of facts developed during the investigation. The supervisor/department head will forward the completed form to the Workers' Compensation Administrator in Human Resources and to the Director of Environmental Health & Safety.

C. Supervisor's Accident Report Form

The Supervisor's Accident report form shall be prepared immediately after an employee reports a work-related injury or illness. The supervisor/department head shall specify what corrective action, if any, was taken. It is the responsibility of the supervisor/department head to see that this form is completed accurately and that the hazards identified have been controlled. The supervisor/department head should submit one copy of the Supervisor's Accident Report form to the Director of Environmental Health and Safety and another copy to the Workers'Compensation Administrator in Human Resources.

D. Bills and Payment for Medical Expenses

1. Payment of all reasonable medical, surgical, hospital, nursing, sick travel, medicines, and rehabilitation services that are prescribed by the approved medical provider to effect a cure or give relief will be covered by Workers' Compensation for compensable injuries. The approved medical provider will bill the university, or the third- party administrator, directly for these expenses.

2. Prescriptions written by an approved medical provider may be filled at any pharmacy. Employees should contact the Workers' Compensation Administrator for reimbursement if any expenses are incurred for prescriptions.

E. Leave Policy

1. Transitional Work Program

   Unless prohibited by the approved treating physician, employees are expected to return to work following a work-related injury. The university provides alternative work assignments in accordance with the State's Return to Work Program. Any restrictions or accommodations identified by the approved physician will be followed. Transitional work assignments may be within the employee's own unit or, if necessary, in another department or division. Sick leave may not be used in lieu of returning to work in a transitional position. Supervisors should contact the Workers' Compensation Administrator in Human Resources for assistance in providing transitional work.

2. Time Lost from Work on Day of Injury

   The injured employee will be paid full salary the day of the injury and will not be charged leave for time lost from work on the day of the injury. However, the employee is expected to return to work after medical treatment on the day of the injury, unless the approved medical provider has prohibited return to work.

3. Use of Leave for Additional Medical Treatment

   Employees who require additional medical visits authorized by the third-party administrator are not charged leave for reasonable time away from work for these appointments. Employees should try to schedule appointments at a time most convenient for their work unit.

4. Additional Time Lost From Work

   If the injury results in lost time away from work due to the physician's prohibiting return to work or the university's inability to provide transitional work, the employee must go on Workers' Compensation leave.

   a. Waiting Period Workers' Compensation leave requires a seven-day waiting period. The following options are available during the waiting period:

1) Exhaust Leave to Remain in Paid Status

Employees may use accumulated vacation or sick leave during the required waiting period to remain in a paid status and then go on Workers' Compensation leave and begin drawing Workers' Compensation weekly benefits. NOTE: Compensatory time may be substituted for sick or vacation leave if applied within the time frames provided under the Hours of Work and Overtime Compensation Policy.

2) Leave Without Pay

Employees may take leave without pay for the required waiting period and then begin drawing Workers' Compensation weekly benefits.

b. Workers' Compensation Weekly Benefits

After the seven-day waiting period, the employee will be eligible to receive 2/3 of weekly average earnings, up to a maximum benefit to be determined annually. However, if the employee has accumulated vacation or sick leave, the employee may supplement Workers' Compensation according to a leave schedule available from Human Resources. If disability continues more than 21 days, the seven-day waiting period is reimbursed in the fourth week of compensation.

c. Salary Continuation for Law Enforcement Officers

Law enforcement officers who are subject to the Criminal Justice Training and Standards Act are eligible to receive full salary compensation for up to two years if incapacity is the result of an injury by accident or occupational disease out of and in the course of their official duties.

F. Continuation of Benefits While on Leave

1. Medical Benefit

The university continues to pay the monthly premium for the employee. Premiums for any dependent coverage must be paid by the employee directly to the UNCW Payroll Department. The employee must pay premiums for any dependent coverage directly to the UNCW Payroll Department.

2. Vacation and Sick Leave

The employee will continue to accumulate vacation and sick leave while on Workers' Compensation leave.

3. Longevity Pay (SPA only)

   SPA employees eligible for longevity pay will receive annual longevity payments while on Workers' Compensation leave.

4. State Retirement Service Credit

   The employee will not receive retirement credit while on Workers' Compensation leave. However, as a member of the State Retirement System, service credits may be purchased in a lump sum payment. The cost is shared by the employee and the university. If payments are not made within six months of return to service, a penalty of 1% per month shall be assessed to the total cost.

   Direct any questions concerning the continuance of benefits while on Workers' Compensation leave to Human Resources.

5. Legislative Increases

   Upon return to work, the employee's salary will be computed based on the employee's last salary plus legislative increase, if any. The employee may also be eligible for a performance increase, if the increase would have been awarded had the employee been at work.

EMPLOYEE'S STATEMENT FOR WORK-RELATED INJURY

Employee should complete this form in detail and return to supervisor. Supervisor will fax to **Human Resources** at **910-962-3840** ***and*** **Environmental Health & Safety** at **910-962-3473** within 24 hours of accident.

Employee Name:	Banner #:
Address:	Phone No:
Dept:	Supervisor:
Date & Time of Injury:	Date & Time Reported:
Name of Person Notified of Injury:	Name of Witness to Accident:
Part(s) of Body Injured:	
Medical Treatment Obtained: ☐ Medac ☐ Emergency Room ☐ Other, please specify:	
Description of Accident: **Be specific**. State where you were, what you were doing, and what happened.	

I understand that the information above will be used by UNC Wilmington and CorVel Corporation to help determine liability for the injury. I acknowledge that the above statement is a true and accurate representation of this information.

_____

Employee's Signature Date

REMEMBER:

- Report all injuries to your supervisor immediately and seek appropriate medical treatment at the university's **approved medical providers.**
- Employees are expected to return to work on the day of the injury unless the approved treating physician states employee is unable to return to work. A written statement must be obtained from the approved treating physician and promptly provided to your supervisor. Use of sick leave for lost time will be approved only if the approved treating physician prohibits return to work.
- Employees who require additional approved medical visits authorized by human resources are not charged leave for reasonable time away from work for these appointments.
- Work routines will be modified to accommodate any restrictions identified by the approved treating physician. If accommodation is not possible within the department, the supervisor will contact human resources for placement of the employee in the transitional work program.

SUPERVISOR'S ACCIDENT REPORT

Supervisor should complete this form and fax to environmental health and safety department (962-3473) and human resources (962-3840) within 24 hours of accident.

Employee Name:	Banner #:
Address:	Phone No:
Dept:	Supervisor:
Date & Time of Injury:	Date & Time Reported:
Name of Person Notified of Injury:	Name of Witness to Accident:
Occupation & Activity of Employee at Time of Accident:	
Status of Job or Activity: ☐ Halted ☐ Continuing ☐ Completed	
Location of Accident:	Part(s) of Body Injured:
Description of Accident:	
Cause of accident:	
State unsafe act, if any:	
State unsafe physical or mechanical condition, if any:	
State unsafe personal factor if any:	
List hazard controls in effect at time of injury designed to prevent injury:	
Personal protective equipment being used at time of accident:	
Corrective action taken or recommended to department safety committee:	
Employee taken to ☐ Medac ☐ Emergency Room ☐ Other, please specify:	
Supervisor's Signature:	Date:

REMEMBER:

- Send employees to the university's **approved medical providers** for treatment**.**
- Report all injuries immediately to human resources (962-3006) and environmental health and safety (962-3108)**.**
- Employees are expected to return to work on the day of the injury unless the approved treating physician states employee is unable to return to work. A written statement must be obtained from the approved treating physician and promptly provided to supervisor. Use of sick leave will be approved only if the approved treating physician prohibits return to work.
- Any restriction that the approved treating physician has placed on the employee's ability to work must be followed. If accommodation is not possible within the department, the supervisor will contact human resources for placement of the employee in the transitional work program.

Appendix 10 – Diver Application

UNCW DIVER APPLICATION

Name_____ Date of Birth ___/___/____

Address _____ City, State, Zip _____

Institution _____ P.I. _____

Telephone: Work _____ Home _____

Diving training or certifications (Attach copies of each card or certificate) - Also list certifications such as CPR, WSI, EMT, etc.

Level	Date	Location	Instructor or Organization

Complete the following scuba dive history:

0 – 30 feet # dives _____

30 – 60 feet # dives _____

60 - 100 feet # dives _____

100-150 feet # dives _____

150+ feet # dives _____

Total # to date _____

Most recent scuba dive:

Date _____

Location _____

Depth _____

BT _____

Appendix 10 – Diver Application

Place an **X** next to the activities, environment(s), and equipment for which you have diving experience:

☐ Ocean	☐ Night diving	☐ U/W still photography
☐ Quarry	☐ Dry suit	☐ U/W videography
☐ Lakes	☐ 5' or less visibility	
☐ Rivers	☐ Full-face mask scuba	
☐ Altitude	☐ Enriched Air Nitrox	
☐ Strong current	☐ Mixed gas diving	
☐ Decompression diving	☐ Saturation (air)	
☐ Cold-water	☐ Recompression chamber	
☐ Cave diving	☐ Twin scuba tanks	
☐ Ice diving	☐ Surface supplied air	
☐ Wreck diving	☐ Lift bags	

Have you ever experienced decompression sickness, air embolism, or other diving accident(s)?

No ☐ Yes ☐

If yes, fill in details:

Date _____ Location _____

Dive profile: Depth _____ Bottom time _____ min.

Equipment used _____ Type problem _____

Physical symptoms observed _____

Initial treatment _____

Follow-up treatment or problems _____

Have you been cleared to resume diving by a qualified Diving Physician?

Yes ☐ No ☐ Physician's Name: _____

Your signature: _____

Date: _____

UNIVERSITY OF NORTH CAROLINA AT WILMINGTON (UNCW)
RELEASE OF LIABILITY, WAIVER OF CLAIMS, ASSUMPTION OF RISK AND INDEMNIFICATION AGREEMENT FOR DIVING

PLEASE READ CAREFULLY BEFORE SIGNING

I, _____, do hereby affirm and acknowledge that I have been fully informed of the inherent hazards and risks associated with snorkeling, skin diving, scuba diving, surface-supplied diving, and/or saturation diving and related diving activities. I fully understand that these risks can lead to personal injury, illness, paralysis, permanent disability, and death or damage to me or my property. I understand that diving operations and activities are inherently dangerous and I have made the decision to participate despite the inherent dangers. Additionally, I understand that there are also risks associated with: dive travel, including, but not limited to, the possible injury or loss of life as a result of a dive boat accident, as well as travel to and from dive sites; drowning, shark bites, capsizing, rough water conditions, water hazards, diving in unfamiliar water; the use or malfunction of diving equipment; injuries inflicted by animals, insects, reptiles or plants; or due to the state of physical conditioning and the physical exertion associated with scuba diving; accidents or illness in remote places without medical facilities; forces of nature including, but not limited to, lightning, weather changes, ocean level changes and other occurrences not named herein; and/or man-made objects in the ocean including, but not limited to, ropes, bridge pilings, and metal junk or debris. Despite the potential hazards and dangers associated with diving and diving related activities, I agree to participate and hereby accept and assume all such risks, known and unknown, and assume all responsibility for the losses, costs, and/or damages following such injury, disability, paralysis or death, not caused by and due to the acts or omissions of UNCW or its employees and authorized agents. The foregoing shall not release UNCW of its obligations under applicable law, rules, or regulations, including the Occupational Safety and Health Act, as applicable. Further, nothing contained herein shall limit, erode, or obviate UNCW's election and entitlement to utilize Scientific Diving protocols pursuant to 29 C.F.R. §1901. et seq.

I understand the nature of the diving and related activities I will be undertaking, I agree no one has a better understanding of my experience and capabilities, and hereby represent and affirm that I am qualified and able to participate in the diving and diving related activities. I am currently a certified scuba diver. I understand that I may inspect the premises, facilities and equipment to be used or with which I may come in contact. If I believe anything is unsafe, I understand I can and will immediately decline to participate further in the diving or related activity. I understand there is no penalty or forfeiture of any sort if I withdraw. I further understand, agree, and acknowledge that UNCW shall neither assume nor be responsible in any way for damages or injuries of any kind related to or arising from my utilization, loan of, or use of either my own or third party equipment.

In consideration of being allowed to participate in snorkeling, skin diving, scuba diving, surface-supplied diving and/or saturation diving, as well as the use of any of the facilities and the use of the equipment of the below listed releases, and expressly excepting negligent acts or omissions on the part of UNCW, I hereby agree as follows:

(1) TO WAIVE AND RELEASE ANY AND ALL CLAIMS that I may have against UNCW or its employees, authorized agents, representatives, and volunteers.

Facility: Center for Marine Science

Others: University of North Carolina at Wilmington

Lead Diver:

Divemaster:

(2) To release and hold harmless UNCW, their officers, directors, employees, representatives, agents and volunteers, from liability and responsibility, whatsoever, for any claim of action that I, my estate, heirs, executors and/or assigns may have for any personal injury, property damage or wrongful death arising from snorkeling, skin diving, scuba diving, surface-supplied diving and/or saturation diving and related activities unless proximately caused by the negligent acts or omissions of UNCW.

(3) By entering into this agreement, I am not relying on any oral or written representation or statements made by UNCW, other than what is set forth in this Agreement. I further agree that this Agreement shall be governed by and interpreted in accordance with the laws of the State of North Carolina, United States of America.

(4) If any provision of this release is found to be unenforceable or invalid, that provision shall be severed from this contract. The remainder of this contract will then be construed as though the unenforceable provision had never been contained in this document.

With the diving process having been fully explained to me and all of my questions answered to my satisfaction, I agree to participate in the scientific diving, fully aware of the activities and risks that may be involved. I also understand that this is a legal document which is binding on me, my heirs and assigns and on those who may claim by or through me. I am eighteen years of age or older, have full capacity to enter into this Agreement, and affirm that I understand and agree to the terms and conditions of this release.

_____

Signature Date Printed Name

_____

Title

_____

Organization

_____

Address

_____

If participant is a minor (under 18 years of age), a parent or guardian must also sign this form.

_____

Parent or Guardian's Signature Printed Name Date

UNCW Scientific Diving Participant Information Form

Principal Investigator: _____ Mission #: _____

Duration of Participation: From _____/_____/_____ To _____/_____/_____

Name of Participant: _____ Date of Birth: _____

Home Address: _____

City and State: _____

Zip Code: _____ Country: _____ Phone #: _____

Institution: _____ Phone #: _____

In An Emergency, Notify: _____ Relationship: _____

Home/Mobile Phone #: _____ Work Phone #: _____

Address: _____

City and State: _____

Zip Code: _____ Country: _____

Insurance Company's Name: _____

Medical/Hospitalization Insurance Policy #: _____

Phone Number of Office Holding Policy: _____

Will you be covered by your employer's Workman's Compensation Policy during the period that you will be participating in UNCW research activities (Circle one)?

● Yes ○ No

I understand that marine related activities, including boating and diving, are strenuous activities that require stamina and good health as essential prerequisites for my safety and well being. I understand and agree that there are risks and hazards inherent to boating and diving activities that include the possible consequences of serious injury or death. I hereby confirm that I have no emotional or health problems incompatible with boating and diving activities. I understand that I need the approval of a licensed physician to conduct diving activities, and that I should seek the approval of a physician if I am uncertain as to my physical fitness for the rigors of boating activities. I understand that I may be required to seek approval from a physician if there is a health or safety question relative to my condition before being allowed to participate in boating or diving activities.

I understand that the availability of medical emergency assistance will be limited or non-existent while participating in at-sea research activities, and that successful treatment of injuries requires early and immediate treatment. Consequently, UNCW often provides staff that are certified to render immediate basic, and when available, advanced life-support care for all medical

emergencies occurring during boating and diving activities. I have read the above statement and affirm that it is correct, and being fully informed of the possibility of injury and even death during boating and diving activities, I do hereby grant qualified UNCW staff permission to treat any injury that may occur including first aid, cardio-pulmonary resuscitation, emergency oxygen first aid, recompression therapy, and transfer to a medical facility for treatment by a physician.

Check the appropriate blank for any that applies to you, and explain under remarks.

	1. Motion sickness		12. Diabetes		23. Hay fever
	2. Hospitalized		13. Tuberculosis		24. Asthma
	3. Serious Injury		14. Bronchitis		25. Trouble equalizing pressure in sinuses/ears
	4. Back problems		15. Claustrophobia		26. Frequent colds or sore throat
	5. Physical handicap		16. High blood pressure		27. Severe or frequent headache
	6. Regular medication		17. Respiratory problems		28. Ear or hearing problems
	7. Allergies, including drugs		18. Persistent cough		29. Alcohol or drug problems
	8. Dizziness or fainting		19. Pregnant		30. Mental or emotional problems
	9. Epilepsy		20. Chest pains		31. Current communicable disease
	10. Heart trouble		21. Contact lenses		32. Rejected from an activity for medical reasons
	11. Sinus trouble		22. Dental plates		33. Any medical problem not listed

Print or type remarks:

I certify that the above information is correct to the best of my knowledge. I further understand that treatment for any medical problems I may suffer is my responsibility and will be paid for by me.

_____ _____

Signature of Participant Date

If participant is a minor (under 18 years of age), a parent or guardian must also sign this form.

_____ _____

Signature of Parent/Guardian Date

UNCW
Guest Diver Application

Candidate Name: _____

Representing: _____

Reason for participation: _____

Candidate has provided the following to the UNCW DSO:

_____ Proof of Diving Certification (Copy of C-Card)

_____ UNCW Participant Information Form

_____ UNCW Release

_____ Completed Diving Resume Form (Appendix 9) with the following:

_____ # Dives to date

_____ Level of certification

_____ Date of last dive

Dive Plan: This Candidate proposes to participate in the following dive activity:

Date(s): _____

Dives: _____ Planned Depth(s): _____

Describe tasks/objectives: _____

_____

_____

Comments: _____

Submitted by: _____ Project Coordinator

_____ Divemaster

****

Approved: _____ by: _____

Disapproved: _____ by: _____

Comments:

DIVING MEDICAL EXAM OVERVIEW FOR THE EXAMINING PHYSICIAN

TO THE EXAMINING PHYSICIAN:

_____ _____, requires a medical examination to assess his/her fitness for Scientific Diving for the University of North Carolina Wilmington. His /her answers on the Diving Medical History Form (attached) may indicate potential health or safety risks as noted. Your evaluation is requested on the attached Diving Physical Examination Report Form. If you have questions about diving medicine, you may wish to consult the Divers Alert Network (DAN) who has diving medical experts on staff: 1-800-446-2671. Please contact the undersigned UNCW Diving Safety Officer if you have any questions or concerns about diving medicine or the medical review standards and procedures. Thank you for your assistance.

_____ _____

UNCW Diving Safety Officer Phone Number

_____ _____

Participants Printed Name Phone Number

Scientific research diving is often performed under harsher conditions and is more arduous than sport SCUBA diving. Also, the locality of the diving may be remote from medical facilities. Please review your records for this diver, including history of illness to determine if there is any problem, which might cause injury or affect performance during strenuous diving activity. A special risk is present if the middle ear, sinuses or lung segments do not readily equalize air pressure changes. The most common cause of distress is Eustachian insufficiency. Most fatalities involve deficiencies in prudence, judgment, emotional stability or physical fitness. Please consult the following list of conditions, which usually restrict candidates from diving.

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

CONDITIONS WHICH MAY DISQUALIFY CANDIDATES FROM DIVING

1. Abnormalities of the tympanic membrane, such as perforation, presence of a monomeric membrane, or inability to autoinflate the middle ears. [5, 7, 8, 9]
2. Vertigo including Meniere's Disease. [13]
3. Stapedectomy or middle ear reconstructive surgery. [11]
4. Recent ocular surgery. [15, 18, 19]
5. Psychiatric disorders including claustrophobia, suicidal ideation, psychosis, anxiety states, untreated depression. [20-23]
6. Substance abuse, including alcohol. [24-25]
7. Episodic loss of consciousness. [1, 26, 27]
8. History of seizure. [27, 28]
9. History of stroke or a fixed neurological deficit. [29, 30]
10. Recurring neurologic disorders, including transient ischemic attacks. [29, 30]
11. History of intracranial aneurysm, other vascular malformation or intracranial hemorrhage. [31]
12. History of neurological decompression illness with residual deficit. [29, 30]
13. Head injury with sequelae. [26, 27]
14. Hematologic disorders including coagulopathies. [41, 42]
15. Evidence of coronary artery disease or high risk for coronary artery disease. [33-35]

16. Atrial septal defects. [39]
17. Significant valvular heart disease - isolated mitral valve prolapse is not disqualifying. [38]
18. Significant cardiac rhythm or conduction abnormalities. [36-37]
19. Implanted cardiac pacemakers and cardiac defibrillators (ICD). [39, 40]
20. Inadequate exercise tolerance. [34]
21. Severe hypertension. [35]
22. History of spontaneous or traumatic pneumothorax. [45]
23. Asthma. [42-44]
24. Chronic pulmonary disease, including radiographic evidence of pulmonary blebs, bullae or cysts. [45, 46]
25. Diabetes mellitus. [46 - 47]
26. Pregnancy. [56]

Attachments: Diving Physical Examination Checklist
Physical Examination Report Form
Diving Medical History Form
Medical History Questions Evaluation Form
Medical Evaluation of Fitness for Diving Report

SELECTED REFERENCES IN DIVING MEDICINE

Available from Best Publishing Company, P.O. Box 30100, Flagstaff, AZ 86003-0100, the Divers Alert Network (DAN) or the Undersea and Hyperbaric Medical Society (UHMS), Durham, NC

Bove, A.A. 2011. The cardiovascular system and diving risk. *Undersea and Hyperbaric Medicine* 38(4): 261-269.

Bove, A.A. and Davis, J. 2003. Diving Medicine, Fourth Edition. Philadelphia: W.B. Saunders Company.

Bove, A.A. ed. 1998. Medical Examination of Sport SCUBA Divers. San Antonio, TX: Medical Seminars, Inc.

Douglas, P.S. 2011. Cardiovascular screening in asymptomatic adults: Lessons for the diving world. *Undersea and Hyperbaric Medicine* 38(4): 279-287.

Edmonds, C., Lowry, C., Pennefather, J. and Walker, R. 2002. Diving and Subaquatic Medicine, Fourth Edition. London: Hodder Arnold Publishers.

Elliott, D.H. ed. 1996. *Are Asthmatics Fit to Dive?* Kensington, MD: Undersea and Hyperbaric Medical Society.

Grundy, S.M., Pasternak, R., Greenland, P., Smith, S., and Fuster, V. 1999. Assessment of Cardiovascular Risk by Use of Multiple-Risk-Factor Assessment Equations. AHA/ACC Scientific Statement. *Journal of the American College of Cardiology,* 34: 1348-1359. http://content.onlinejacc.org/cgi/content/short/34/4/1348

Mitchell, S.J., and Bove, A.A. 2011. Medical screening of recreational divers for cardiovascular disease: Consensus discussion at the Divers Alert Network Fatality Workshop. *Undersea and Hyperbaric Medicine* 38(4): 289-296.

NOAA Diving Manual, NOAA. Superintendent of Documents. Washington, DC: U.S. Government Printing Office.

Thompson, P.D. 2011. The cardiovascular risks of diving. *Undersea and Hyperbaric Medicine* 38(4): 271-277.

U.S. Navy Diving Manual. Superintendent of Documents, Washington, DC: U.S. Government Printing Office, Washington, D.C.

UNCW/AAUS MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING

Name of Applicant (Print or Type)	Date of Medical Evaluation (Month/Day/Year)

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

TESTS: THE FOLLOWING TESTS ARE <u>REQUIRED</u>:

DURING ALL INITIAL AND PERIODIC RE-EXAMS :

- Medical history
- Complete physical exam, with emphasis on neurological and otological components
- Urinalysis
- CBC and Chem Panel
- Chest X-Ray (PA & Lateral)
- Resting EKG
- Pulmonary Function Test (PFT)
- Audiogram
- Pre and Post Exercise PFT with Albuterol (for anyone with history of smoking, asthma, COPD, Reactive Airway Disease, or any other pulmonary limiting problem)
- Cardiac Stress Test (for anyone with known Carotid Artery Disease or with multiple risk factors for Carotid Artery Disease)
- Any further tests deemed necessary by the physician

PHYSICIAN'S STATEMENT:

_____ Diver **IS** medically qualified to dive for: _____2 years (over age 60)
_____3 years (age 40-59)
_____5 years (under age 40)

_____ Diver **IS NOT** medically qualified to dive:_____Permanently_____Temporarily.

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

_____ MD or DO _____
Signature Date

_____
Name (Print or Type)

_____
Address

_____
Telephone Number E-Mail Address

My familiarity with applicant is: _____This exam only

_____Regular physician for _____ years

My familiarity with diving medicine is: _____

_____

MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING REPORT

APPLICANT'S RELEASE OF MEDICAL INFORMATION FORM

_____

Name of Applicant (Print or Type)

I authorize the release of this information and all medical information subsequently acquired in association with my diving to the UNCW Diving Safety Officer and Diving Control Board or their designee at the UNCW Center for Marine Science, 5600 Marvin K. Moss Lane, Wilmington, NC 28409 on (date) _____.

Signature of Applicant _____

Appendix 16 – Medical History

MEDICAL HISTORY

(To Be Completed By Applicant-Diver)

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

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

TO THE APPLICANT:

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

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

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

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

Appendix 16 – Medical History

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

Appendix 16 – Medical History

	Yes	No	Please indicate whether or not the following apply to you	Comments
44			Shortness of breath	
45			Lung problem or abnormality	
46			Spit blood	
47			Breathing difficulty after eating particular foods, after exposure to particular pollens or animals	
48			Are you subject to bronchitis	
49			Subcutaneous emphysema (air under the skin)	
50			Air embolism after diving	
51			Decompression sickness	
52			Rheumatic fever	
53			Scarlet fever	
54			Heart murmur	
55			Large heart	
56			High blood pressure	
57			Angina (heart pains or pressure in the chest)	
58			Heart attack	
59			Low blood pressure	
60			Recurrent or persistent swelling of the legs	
61			Pounding, rapid heartbeat or palpitations	
62			Easily fatigued or short of breath	
63			Abnormal EKG	
64			Joint problems, dislocations or arthritis	
65			Back trouble or back injuries	
66			Ruptured or slipped disk	
67			Limiting physical handicaps	
68			Muscle cramps	
69			Varicose veins	

Appendix 16 – Medical History

	Yes	No	Please indicate whether or not the following apply to you	Comments
70			Amputations	
71			Head injury causing unconsciousness	
72			Paralysis	
73			Have you ever had an adverse reaction to medication?	
74			Do you smoke?	
75			Have you ever had any other medical problems not listed? If so, please list or describe below;	
76			Is there a family history of high cholesterol?	
77			Is there a family history of heart disease or stroke?	
78			Is there a family history of diabetes?	
79			Is there a family history of asthma?	
80			Date of last tetanus shot? Vaccination dates?	

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

_____
_____
_____
_____
_____
_____

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

Signature Date