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Section One:
ORGANIZATION

1.1 LEGAL FRAMEWORK

Scientific diving is exempt from the OSHA Commercial Diving Standard provided that specific requirements are met.

The following is from the State of California Code of Regulations (CCR) Title 8, Article 152, General Diving Industry Safety Orders, giving the specific exemption and necessary requirements.

> *Scientific diving operations under the direction and control of a diving program containing at least the following elements (are exempt):*
>
> *Diving Safety Manual which includes at a minimum: procedures covering all diving operations specific to the program; procedures for emergency care, including recompression and evacuation; and criteria for diver training and permitting.*
>
> *Diving Control (Safety) Board, with the majority of its members being active 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; permit the depths to which a diver has been trained; take disciplinary action for unsafe practices; and assure adherence to the buddy system (see section 2.15).*

This Manual complies with Title 8, Article 152, and the American Academy of Underwater Sciences (hereafter referred to as AAUS) Standards for Scientific Diving and Permitting and Operations of Scientific Diving Programs. The AAUS document represents the minimal safety standards for scientific diving at the present state-of-the-art. This manual is intended to meet or exceed those standards.

1.1.1 CAMPUS POLICY ON DIVING

It is the policy of the University of Southern California that all diving under University auspices be carried out in accordance with the provisions of the University of Southern California Diving Safety Manual.

1.1.2 CAMPUS ORGANIZATION

The University of Southern California Diving Program consists of the Diving Control Board (DCB), the Diving Safety Officer (DSO), and the administrative support of the Diving Program. All diving done under the auspices of USC shall be administered through the Diving Control Board and Diving Safety Officer.

1.2 PURPOSE

1.2.1 THE DIVING SAFETY PROGRAM

The purpose of this manual is to ensure that all diving done under the auspices of the USC is conducted in a manner most likely to minimize accidental injury, occupational illness, damage to property or endangerment of natural resources; to set forth rules, regulations and standards that will ensure proper and safe use of University equipment and facilities; and to promote intelligent investigation of underwater habitats. Fulfillment of this purpose shall be consistent with maximum possible safety.

1.2.2 THE DIVING SAFETY MANUAL

The Diving Safety Manual shall define the requirements, procedures, and protocols which establish and govern the University of Southern California Diving Program. The Diving Program encompasses all compressed gas diving activities carried out under the auspices of the University of Southern California. It is recognized that compressed gas diving has inherent risks. To minimize those hazards, all University regulations and procedures contained herein shall be carried forward to the letter and the spirit of safety in diving operations.

1.3 SCOPE

1.3.1 DIVING DEFINED

All diving, for the purposes of this manual, is defined as compressed gas diving performed by individuals necessary to or part of scientific research, training, educational endeavors, or other activities conducted under the auspices of the University of Southern California.

1.3.2 UNIVERSITY AUSPICES DEFINED

University auspices shall include:

1.3.2.1 *Equipment:*

Anyone who uses University equipment for compressed gas diving.

1.3.2.2 *Locations:*

Anyone who conducts compressed gas diving activities from locations owned or operated by the University of Southern California.

1.3.2.3 *Relationships:*

Any University employee(s) acting within the scope of their employment, University student(s) while participating in University affiliated activities, and

anyone engaged in University authorized research, regardless of the ownership of the equipment used.

If any one of these conditions apply the diving must follow the provisions outlined in this Diving Safety Manual.

1.4 RELEASES

In adopting the policies set forth in this manual, the University of Southern California assumes no liability that is not otherwise imposed by law. Outside of those 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. The University recommends that each diver carry medical and/or diving accident insurance. All students, employees, and persons diving under University auspices shall execute a release holding USC harmless from any claims which might arise in connection with scuba diving or other diving modes. (see Appendix D)

1.5 THE DIVING CONTROL BOARD

1.5.1 APPOINTMENT AND COMPOSITION

The Diving Control Board (DCB) is an Administrative Committee appointed by the University's vice-president of Business Affairs. The tenure of each specific Board member is at the discretion of the vice-president upon recommendation of the DCB.

A majority of the Board must be active scientific divers as mandated by California: CCR Title 8 Article 152 §6050-6063 and the Federal: 29CFR §1910.401-1910.441.

The Board will meet under the chairmanship of the appointed Chairman of the Board. The Chairman will be picked by the Board and serve in this position usually for one year. Chairmanship may be extended at the discretion of the Board members.

A quorum is defined as four members, one of which must be the chair.

1.5.2 AUTHORITY AND RESPONSIBILITY

The DCB has the authority granted by California: CCR Title 8 Article 152 §6050-6063 to:

1.5.2.1 Approve and monitor diving projects and the dive project manager

1.5.2.2 Review and revise the Diving Safety Manual

1.5.2.3 Assure compliance with the Manual

1.5.2.4	Certify the depths to which a diver has been trained
1.5.2.5	Take disciplinary action for unsafe diving practices
1.5.2.6	Assure adherence to the buddy system for scuba diving
1.5.2.7	Issue, reissue or revoke diving permits
1.5.2.8	Recommend changes in policy and amendments to the manual as the need arises
1.5.2.9	Establish and/or approve training programs through which the applicants for permitting can satisfy the requirements of the Diving Safety Manual
1.5.2.10	Suspend diving programs which it considers to be unsafe, or which otherwise violate the Diving Safety Manual
1.5.2.11	Establish criteria for equipment selection and use
1.5.2.12	Recommend new equipment or techniques
1.5.2.13	Establish and/or approve facilities for the inspection and maintenance of diving and associated equipment
1.5.2.14	Ensure that air station(s) owned or managed by the University of Southern California meet air quality standards (see section 6.10)
1.5.2.15	Periodically review the Diving Safety Officer's performance and the diving safety program
1.5.2.16	Act as a board of appeal to consider diver related problems
1.5.2.17	Sit as a board of investigation to inquire into the nature and cause of diving accidents or violations of the Diving Safety Manual.

1.6 THE DIVING SAFETY OFFICER

1.6.1 APPOINTMENT AND QUALIFICATION

The Diving Safety Officer (DSO) shall be appointed by the responsible administrative officer or designee, with the advice and counsel of the DCB. The DSO shall be a permitted scientific diver and a certified scuba instructor or have the equivalent diving supervisory experience.

1.6.2 AUTHORITY AND RESPONSIBILITIES

The DSO shall:

1.6.2.1 Conduct the scientific diving program and report through the DCB to the responsible administrative officer or designee. The operational authority for the program rests with the DSO and shall include:

- 1.6.2.1.1 The conduct of training and permitting
- 1.6.2.1.2 The approval of dive plans
- 1.6.2.1.3 The maintenance of diving records
- 1.6.2.1.4 Ensuring the program's compliance with the Diving Safety Manual and all relevant regulations
- 1.6.2.1.5 Recommending changes in the Diving Safety Manual to promote safe diving practice.

1.6.2.2 May permit portions of the diving program to be carried out by a qualified delegate, although the DSO may not delegate responsibility for the safe conduct of the Diving Safety Program.

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

1.6.2.4 Shall suspend diving operations which the DSO considers to be unsafe or unwise and immediately inform the DCB.

1.6.2.5 Shall evaluate equipment maintenance programs and recommend, for DCB approval, organizations and/or individuals qualified to inspect and maintain diving equipment.

1.6.2.6 Shall recommend equipment and disapprove unsafe equipment for use by divers.

1.6.2.7 Shall conduct general surveillance of the diving program and diving projects and recommend to the DCB changes in or additions to policy, standards and regulations to promote safety in diving.

1.7 PROJECT DIVE MANAGER

1.7.1 RESPONSIBILITY

The manager shall be personally responsible for assuring that diving activities in the projects the manager directs are conducted in accordance with the requirements of
this Manual. The manager shall also be considered the Lead Diver (see section 2.22) unless the manager designates someone to that position and notifies the DSO of this designation.

1.7.2 CERTIFIED DIVERS

The manager shall personally determine that each person whom the manager permits or assigns to dive on projects under their direction possess a valid diver's permit issued by the DCB. The manager shall submit a list of divers who will participate and their permit numbers to the DSO before the diving project begins. (see Appendix E)

Section Two:
REGULATIONS AND PROCEDURES

2.1 GENERAL REQUIREMENTS

2.1.1 PERMITTING REQUIRED

No person shall engage in compressed gas diving unless the diver holds a valid permit issued by the DCB pursuant to the provisions of this Manual or is engaged in training as prescribed by this Manual.

2.1.2 DEPTH LIMITATIONS

A permitted diver shall not exceed their depth permit unless accompanied by a diver permitted to at least the next greater depth. Under these circumstances, the diver may not exceed their depth limit by more than one depth category. No diver may supervise more than one diver who is exceeding their depth certification without prior approval of the DSO. All dives deeper than 100 feet are subject to the approval of the DSO, and may require special procedures. All dives deeper than 130 feet are considered required decompression dives and require approval by at least two members of the DCB.

2.1.3 DIVING PROJECT APPROVAL

All diving projects shall be approved by the DCB prior to the start of diving activities. Any modifications to approved project dive plan require written notification and approval of the DSO. The project dive manager shall submit a project dive plan (see Appendix E) that includes the following:

2.1.3.1 Diving mode

2.1.3.2 Breathing gas supply

2.1.4.3 Thermal protection

2.1.4.4 Divers qualifications and the type and number of the permit held by each diver

2.1.4.5 Emergency plan (see section 8.0) with the following information:

2.1.4.5.1 Name, telephone number and relationship of the person to be contacted for each diver in the event of an emergency

2.1.4.5.2 Nearest operational recompression chamber

2.1.4.5.3 Nearest accessible hospital
2.1.4.5.4 Available means of transport.

2.1.4.6 Approximate number of proposed dives

2.1.4.7 Location(s) of proposed dives

2.1.4.8 Estimated depth(s) and bottom times(s) anticipated

2.1.4.9 Decompression status and repetitive dive plans, if required

2.1.4.10 Proposed work, equipment, and boats to be employed

2.1.4.11 Any hazardous conditions anticipated

2.1.4.12 Any specialized diving conditions (see section 2.30)

2.1.4.13 Deviations from manual requirements require advance approval from DCB. Alternative measures must be approved by the DCB.

2.1.4 SOLO DIVING PROHIBITED

All diving conducted shall be planned and executed in such a manner as to ensure that every diver maintains constant, effective communication with at least one other comparably equipped permitted scientific diver who is also in the water. This buddy system is based upon mutual assistance, especially in the case of an emergency.

2.1.5 DEVIATIONS FROM REQUIREMENTS IN EMERGENCIES

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 deviations must be promptly submitted to the DSO explaining the circumstances and justifications for such action.

2.1.6 EMERGENCY/ACCIDENT REPORTING

Diving Emergency Management procedures shall be developed for each dive location and shall consider diver evacuation and medical treatment. (see section 8.0) In the event of a diving emergency immediately notify the DSO or designee. Complete and submit appropriate Diving Incident/Accident form

to the DCB. All diving deaths or accidents requiring recompression treatment shall be reported to AAUS. (see Appendix L)

2.2 GENERAL DIVING PROCEDURES

2.2.1 COLD AND ARDUOUS DIVING

It is the responsibility of the diver to ensure proper use of the dive tables or a dive computer, and to determine the diver's thermal and fatigue status during a dive. The proper procedure for cold or arduous dives with regards to dive table use is to use the next greater bottom time when calculating end of dive letter group. For cold and arduous dives, use the next greater time and depth for letter group determination. When using a dive computer as a decompression model during a cold and/or arduous dive, the dive plan should be amended accordingly.

2.2.2 LEAD DIVER

The lead diver shall be a permitted scientific diver. For each dive one individual shall be designated as the lead diver. The lead diver shall be at the dive location during the diving operation. The lead diver shall be responsible for preparing a dive plan consistent with approved project plan (see section 2.13); coordinating with other known activities in the vicinity which are likely to interfere with diving operations; briefing the dive team members on the dive plan, daily diving conditions and the fitness of divers.

2.2.3 ON-SITE DIVE PLANNING

The daily dive plan shall be planned around the competency of the least experienced diver and include considerations of the following:

2.2.3.1 Diving locations

2.2.3.2 Surface and underwater conditions and hazards

2.2.3.3 Diving equipment

2.2.3.4 Dive team assignments

2.2.3.5 Residual inert gas status of dive team members

2.2.3.6 Emergency procedures

2.2.4 SAFETY CHECKS

2.2.4.1 *Pre-Dive:*

Each scientific diver shall conduct a functional check of their diving, research and support equipment in the presence of the diving buddy or tender.

2.2.4.2 *Post-Dive:*

After the completion of a dive, each diver shall report any physical problems, symptoms of any type of barotrauma, equipment malfunctions, omitted decompression or unplanned required decompression to the lead diver and DSO.

2.2.4.3 *Flying after Diving:*

The minimum surface interval before flying at altitudes greater than 2000 feet above sea level after diving is 24 hours. Extended surface intervals shall be required in cases where an exceptional number of dives or required decompression diving occurs on the last diving day.

2.2.4.4 *Altitude Change after Diving:*

Divers whose surface transportation will take them to altitude greater than 2000 feet above sea level following a dive must consider the effects of the elevation and plan a surface interval sufficient to avoid decompression injuries.

2.2.4.5 *Responsibility:*

The decision to dive is that of the individual diver. A diver may refuse to dive, without fear of penalty, whenever the diver feels it is unsafe to make the dive.

2.2.4.6 *Safety:*

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

2.2.5 TERMINATION OF A DIVE

2.2.5.1 *Responsibility:*

It is the responsibility of the individual diver to terminate the dive, without fear of penalty, whenever the diver feels it is unsafe to continue the dive.

2.2.5.2 *Safety:*

The dive shall be terminated while there is still sufficient cylinder pressure to permit the diver to safely reach the surface, including any decompression time, or to safely reach an additional air source at a planned decompression station.

2.2.6 USE OF REQUIRED EQUIPMENT

2.2.6.1 *Diver's Flag:*

The appropriate diver's flag shall be prominently displayed whenever diving is conducted from a boat or pier or under any circumstances in which water traffic is probable.

2.2.6.2 *Flotation and Buoyancy Control Device:*

All divers shall have adequate flotation and buoyancy control gear on every dive. This device must provide positive flotation at the surface and be capable of adjusting buoyancy while underwater.

2.2.6.3 *Timing Devices, Depth Gauges and Pressure Gauges:*

All members of the diving team must have an underwater time-keeping device, an approved depth indicator, and a submersible pressure gauge.

2.2.6.4 *Dive Tables and Dive Computers:*

A set of appropriate diving tables approved by the DCB must be available at the dive location. Dive computer models and use must be approved by the DCB. (see Appendix J)

2.2.6.5 *Alternate Gas Sources:*

An alternate gas source is required on all dives. An alternate gas source is defined as an alternate second stage regulator (octopus), an alternate inflation regulator (combination of second stage regulator and power inflator), or a redundant gas system (pony or bail out bottle). A redundant gas system approved by the DCB (or approved alternative) is required (minimum of one per buddy team) on all dives below 100 feet.

2.2.6.6 *Emergency Supplies:*

A first aid kit, oxygen and a person trained in its use shall be available at the dive location.

2.2.6.7 *Cutting Tool:*

All members of the diving team must carry a tool capable of cutting monofilament line, kelp, etc.

2.2.7 DIVING LOG

Each permitted diver shall log every dive made under University of Southern California auspices. Divers are encouraged to submit logs of all diving activity, including recreational dives. Recreational diving activities may count towards the diving activity of a permitted diver at the discretion of the DSO. Recreational dives should be conducted in accordance with national safe diving guidelines. Dive logs shall be submitted monthly to the DSO. (see Appendix K)

2.3 SPECIALIZED DIVING CONDITIONS

Any diving techniques, procedures or modes including but not limited to items below shall require prior approval by the DCB and the DSO to ensure that proper training and appropriate equipment be available.

- Saturation Diving
- Surface supplied air including hookah
- Mixed-gas diving (see section 7.0)
- Closed and semi-closed-circuit
- Enclosed and confined spaces
- Required decompression diving
- Polar and ice diving
- Polluted water
- Altitude diving
- Blue-water diving
- Dives deeper than 100 fsw

2.3.1 REQUIRED DECOMPRESSION DIVING

It is the general policy of the University of Southern California Diving Safety Program to avoid required decompression diving. Any required decompression dive that is planned and approved will be subject to a minimum of the following specific considerations:

2.3.1.1 The dive team must have a down line with a reserve cylinder with enough second stage regulators for each diver, and a pressure gauge attached.

2.3.1.2 The dive team must stay within physical contact or visual distance of the descent line.

2.3.1.3 The dive team must use scuba cylinders with enough gas for the planned dive and required decompression leaving enough as an emergency reserve gas supply.

2.3.1.4 The dive team must make no more than one required decompression dive in any 24 hour period.

2.3.1.5 The dive team must not make any dives 24 hours before or after a required decompression dive unless approved by the DSO.

2.3.2 SURFACE SUPPLIED DIVING

Surface supplied diving operations under the auspices of the University of Southern California will be approved in writing by the DCB. A dive plan for the surface supplied diving operation will be submitted by the lead diver no less than 30 days before the start of the operation. Proof of training in the use of the surface supplied diving equipment used will be required for all divers in the team. Temporary diving permits will not be granted for surface supplied diving operations.

2.3.2.1 Surface supplied diving requires as a minimum the following dive team:

2.3.2.1.1 Supervisor/Time keeper
2.3.2.1.2 Hose Tender
2.3.2.1.3 Diver
2.3.2.1.4 Stand-by Diver.

2.3.2.2 The diver shall be equipped with a diver carried, independent reserve breathing gas supply.

2.3.2.3 The stand-by diver shall have equivalent depth and operational capabilities. The stand-by diver shall be ready to enter the water immediately in an emergency.

2.3.2.4 The diver shall maintain voice communication with the supervisor through the use of an approved communication system.

2.3.2.5 The surface supplied breathing gas shall be sufficient to support all surface supplied divers in water for the

duration of the planned dive and an emergency situation, including required decompression.

2.3.3 CLOSED AND SEMI-CLOSED CIRCUIT SYSTEMS

Divers wishing to use closed and/or semi-closed circuit systems (rebreathers) in the course of their research must show evidence of specialized training in the particular equipment being used. DCB approval in writing is required for both the diving operation and the equipment being used. Oxygen partial pressure in the breathing gas shall not exceed 1.5 atmospheres.

2.3.4 BLUE WATER DIVING

Divers wishing to use blue water diving in the course of their research must demonstrate evidence of proper training. DSO approval is necessary for all blue water diving operations. For minimum standards pertaining to blue water diving please see:

Heine, J.N. 1986. Blue Water Diving Guidelines. A California Sea Grant College Program Publication, no.T-CSGCP-014 Univ. of Calif., La Jolla., pp. 47**.**

2.3.5 NIGHT DIVING

Before acting as the lead diver on a night dive, the diver must be night qualified. To qualify, the diver must complete four night dives with the DSO or designee, and any supplemental training required at the discretion of the DSO.

During the day prior to the planned night dive, the dive team leader will notify the DSO or designee of the divers' intention to night dive. A shore contact person will be designated for each night dive. The shore contact person shall meet the following criteria:

2.3.5.1 Qualified and capable of using small boats and a VHF radio

2.3.5.2 Be present during the night dive

2.3.5.3 Know the exact location of the night dive

2.3.5.4 Know the time that the night dive will begin and the expected time of return

2.3.5.5 Have a functioning hand held light

2.3.5.6 Proper training in emergency procedures (see section 3.21D and section 8.0), including scuba rescue training.

2.3.6 MULTI-DAY DIVING

There are indications that multi-day diving (a series of dive profiles made within several consecutive days, particularly when the diver approaches the maximum no-decompression limits on any of these profiles) can result in decompression sickness, even though the diver may technically stay within the no-decompression limits. Multi-day diving plans should be discussed with the DSO. During diving projects that require heavy activity over an extended period the following precautions will be adhered to:

2.3.6.1 Surface intervals will be maximized

2.3.6.2 Ascents should not exceed 30 feet per minute

2.3.6.3 During each ascent stop at 10 to 20 feet for 3 to 5 minutes

2.3.6.4 Take every fourth day off from diving.

Section Three:
PERMITTING

3.1 PERMIT TYPES

3.1.1 SCIENTIFIC DIVER PERMIT:

This permit indicates a diver has completed all training to be a scientific diver and is permitted to dive. The permit is valid only while it is current and used for its intended purpose.

3.1.2 DIVER-IN-TRAINING (DIT) PERMIT:

This permit signifies that a diver has completed a minimum of 40 hours of training with at least five open water dives, and possess a nationally recognized diving certificate or equivalent. Divers with this permit will be required to complete further training in scientific diving before receiving a scientific diver permit.

3.1.3 TEMPORARY DIVER PERMIT.

This permit is issued following a demonstration of the required proficiency in diving. It is valid only for a specified time, as determined by the DSO. The DSO shall report all such issuance to the DCB in writing.

3.2 REQUIREMENTS FOR PERMITTING

3.2.1 SCIENTIFIC DIVER PERMIT

3.2.1.1 *Eligibility:*

Only persons intending to dive under University auspices are eligible for Scientific Diver permitting.

3.2.1.2 *Application:*

Application for diver permitting shall be made to the DCB on the form prescribed. (see Appendix A)

3.2.1.3 *Medical Examination:*

Each applicant for diver permitting shall submit a statement by a physician, based on medical examination, attesting to the applicant's physical fitness for diving with scuba. This examination shall follow the format prescribed by the Diving Control Board. (see Appendices B and C)

3.2.1.4 *Emergency Care Training:*

3.2.1.4.1 CPR must be current
3.2.1.4.2 First aid evidence of training

3.2.1.4.3 Emergency Oxygen Provider training must be current

3.2.1.5 *Training:*

All applicants shall have successfully completed training and experience, beyond Diver in Training (DIT) permit, approved by the Diving Control Board. Minimum cumulative time beyond DIT for theoretical aspects and practical training should equal or exceed 100 hours.

3.2.1.6 *Evaluation:*

All applicants shall be evaluated as a condition of permitting. Evaluations shall include as a minimum in water skills demonstration and a written examination. Written exam may include the following topics: diving physics, physiology, medicine, fitness, rescue, first aid, dive tables, the diving environment (physical and biological), research methods, and University regulations.

3.2.1.7 *Waiver:*

All divers must sign a University of Southern California waiver. (see Appendix D)

3.2.2 DIVER-IN-TRAINING

This permit signifies that a diver has met all the requirements for scientific diver permitting of section 3.21 except for sections 3.21E (Training) and 3.21F (Evaluation). Said diver must have completed a minimum of 40 hours of training with at least 5 open water dives. Divers with this permit are expected to complete further training towards the scientific diving permit.

3.2.3 TEMPORARY DIVING PERMIT

The DSO may waive the requirements of section 3.21, with the exceptions of 3.21C (Medical Examination) and 3.21G (Waiver), if the person in question has a demonstrated proficiency in diving and can contribute measurably to a planned dive. The person in question may be asked to make a confined and/or open water evaluation dive before being issued the temporary permit.

A statement of the temporary diver's qualifications shall be submitted to the DSO as a part of the dive plan. Temporary permission to dive shall be restricted to the planned diving operation, is valid only for the time period indicated, is limited to a maximum of two dives per day, and is issued as a 40' permit. This permit is not to be construed as a mechanism to circumvent existing standards set forth in this manual. Divers wishing a temporary diving permit must submit the application to the DSO. (see Appendix H)

Any diving project that requires extensive use of temporary permits must obtain special permission from the DCB.

3.2.4 COMPLETION OF REQUIREMENTS

Completion of the permitting requirements does not automatically result in permission to dive under University auspices. The diver must satisfy a majority of the DCB members and the DSO, that the diver is sufficiently skilled, and both physically and mentally proficient to be permitted. This proficiency and skill will be attested to by the signatures of the Board Chairperson and the DSO on the diving permit.

3.2.5 RECIPROCITY AND WAIVER OF REQUIREMENTS

3.2.5.1 *Waiver:*

If an applicant for permitting can show evidence of previous qualifying experience or training, the Diving Control Board may grant a waiver for specific requirements of training and experience. (see Appendix G)

3.2.5.1 *Reciprocity And Visiting Scientific Diver:*

See Appendix F for AAUS Diving Reciprocity Authorization form.

3.2.5.1.1 Two or more Scientific Diving programs engaged jointly in diving activities, or engaged jointly in the use of diving resources, shall designate one of the participating Diving Control Boards to govern the joint dive project.

3.2.5.1.2 A visiting scientific diver shall apply for permission to dive under the auspices of the University by providing a completed letter of reciprocity. The truth and accuracy of the information contained herein shall be attested to by the Chairperson of the home DCB or the home DSO.

3.2.5.1.3 If, in the opinion of the DSO, the environment and/or equipment will

be significantly different than the norm for a visiting scientific diver, the diver may be asked to demonstrate his/her knowledge and skills for the planned diving.

3.2.5.1.4 If the visiting scientific diver is denied permission to dive, the DCB shall promptly submit to the diver and the diver's home DCB a written explanation of all reasons for the denial.

3.3 DEPTH PERMITTING

The scientific diving permit will authorize the holder to dive to the depth indicated on the permit. (see section 2.11) All training dives must be pre-approved by the Diving Safety Officer.

3.3.1 DIVER IN TRAINING (40 Feet)

See section 3.l0B and 3.22.

3.3.2 SCIENTIFIC DIVER PERMIT (40 Feet)

Upon completion of requirements listed in section 3.21 the diver is issued this permit. A total of 12 dives under supervision are required before diver is eligible to begin training towards 60 foot certification.

3.3.3 SCIENTIFIC DIVER PERMIT (60 Feet)

A diver holding scientific diver permit (40 feet) may be permitted to a depth of 60 feet after successfully completing, under supervision of another diver approved by the DSO, and permitted to at least 60 feet, 12 logged training dives to depths between 40 and 60 feet, for a minimum total bottom time of 4 hours. Additional training may be required. (see section 3.24)

3.3.4 SCIENTIFIC DIVER PERMIT (100 and 130 Feet)

A diver holding a 60 or a 100 foot permit may be permitted to depths of 100, and 130 feet respectively by successfully completing, under supervision of another diver permitted to at least the next greater depth, and approved by the DSO, at least 4 dives between 60 and 100 feet, and/or 100 and 130 feet. Divers wishing 100 and/or 130 foot permits shall demonstrate proper need of such permits to the DSO prior to beginning training.

3.3.5 SCIENTIFIC DIVER PERMIT (Greater than 130 Feet)

Divers wishing depth permits greater than 130 feet shall demonstrate proper need for such permits to the DSO and DCB prior to beginning training.

3.4 MAINTENANCE OF PERMIT

3.4.1 TERM OF PERMIT

All diving permits shall remain current so long the following requirements are maintained: diving activity, medical exam, CPR training, equipment maintenance, University affiliation (or volunteer status), and oxygen administration training.

3.4.1.1 *Diving Activity:*

During any 12 month period, each permitted diver must log one dive to the depth range of permitting every six months with a minimum of 12 dives annually. Failure to meet these requirements may be cause for the DSO to suspend and/or the DCB to revoke or restrict a permit.

3.4.1.2 *Medical Examination:*

All permitted divers shall pass a medical examination at intervals not exceeding three years up to age 40 and two years after age 40. (see Appendices B and C) After each illness or injury, permitted divers shall submit to medical interview and/or medical examination before resuming diving activities.

3.4.1.3 *CPR Training:*

CPR training must be kept current and renewed as prescribed by the training agency.

3.4.1.4 *Equipment:*

On an annual basis personal equipment including the regulator, depth gauge, backpack, cylinders, buoyancy compensator devices and pressure gauges shall be inspected and serviced as needed and documentation must be reviewed by the DSO or designee.

3.4.1.5 *Affiliation:*

Divers must retain a University affiliation as defined by section 1.32C, or be on current volunteer status.

3.4.1.6 *Oxygen Administration Training:*

Oxygen administration training must be kept current as prescribed by the training agency.

3.5 REVOCATION OF PERMIT

A diving permit may be suspended by the judgement of the DSO or designee then revoked or restricted for cause by a majority of the DCB at the next regular or extraordinary meeting. Violation of any regulation in this Manual may be considered cause. A diver whose permit is in jeopardy shall be given an opportunity to present his/her case to the Board at the next regular or extraordinary meeting, who shall be in attendance as a body to consider the case presented.

3.6 RE-PERMITTING AFTER REVOCATION

If a diver's permit expires the diver may be re-permitted after complying with such conditions as the DCB may impose. Such conditions shall be agreed to by a majority of the Board. The diver shall be given the opportunity to present a case to the Board before conditions for re-permitting are stipulated.

Section Four:
TRAINING

4.1 PRE-TRAINING STANDARDS

4.1.1 MEDICAL EXAMINATION

The applicant for training shall submit completed medical forms as prescribed in Appendices B and C.

4.1.2 SWIMMING TEST

The applicant for training shall successfully perform the following tests in confined water in the presence of the DSO or designee:

4.1.2.1 Swim under water without fins for a distance of 75 feet without surfacing

4.1.2.2 Swim under water without fins for a distance of 125 feet, surfacing not more than four times

4.1.2.3 Swim 1,350 feet in less than 12 minutes without fins

4.1.2.4 Surface dive without fins to a depth of 10 feet, recover a swimmer and tow the swimmer 75 feet at the surface

4.1.2.5 Without fins, tread water continuously for a period of 10 minutes or 2 minutes with hands out of the water.

4.2 SCUBA TRAINING

4.2.1 CONFINED WATER TRAINING

At the completion of confined water training, the trainee must satisfy the DSO or designee of the trainee's ability to perform at minimum the following in a confined water setting:

4.2.1.1 Demonstrate an understanding of underwater signs and signals

4.2.1.2 Demonstrate proper entry and exit procedures

4.2.1.3 Demonstrate proper use of a buoyancy compensator

4.2.1.4 Remove and replace weight belt

4.2.1.5 Clear face mask and regulator

4.2.1.6 Demonstrate air sharing, including both buddy breathing, and the use of alternate air source, as both donor and recipient, with and without a face mask

4.2.1.7 Demonstrate rescue, transport and simulated artificial respiration of a “victim" by an approved method

4.2.1.8 Demonstrate the ability to remove and replace equipment while submerged.

4.2.2 OPEN WATER TRAINING

The trainee must satisfy the DSO or designee of the trainee’s ability to perform at a minimum the following in an open water environment:

4.2.2.1 Demonstrate proficiency in air sharing, including both buddy breathing and the use of alternate air source, as both donor and recipient

4.2.2.2 Enter and leave surf wearing scuba

4.2.2.3 Kick on the surface 400 yards while wearing scuba gear, but not breathing from the scuba unit

4.2.2.4 Demonstrate, where appropriate, the ability to maneuver efficiently in the environment, at and below the surface

4.2.2.5 Complete a simulated emergency swimming ascent

4.2.2.6 Demonstrate ability to achieve and maintain neutral buoyancy while submerged

4.2.2.7 Demonstrate techniques of self-rescue and buddy rescue

4.2.2.8 Navigate underwater

4.2.2.9 Plan and execute a dive

4.2.2.10 Demonstrate familiarity with equipment in the water

4.2.2.11 Demonstrate the ability to enter and exit small boats

4.2.2.12 Successfully perform a minimum of 12 open water dives for a minimum total time of 6 hours, accompanied or supervised by the DSO or qualified designee. No more than 3 dives shall be made in any one day.

4.2.3 WRITTEN EXAMINATION

Before completing training, the trainee must pass a written examination. Written exam may include the following topics: diving physics, physiology, medicine, fitness, rescue, first aid, dive tables, the diving environment (physical and biological), research methods, and University regulations and policies.

4.3 ADDITIONAL TRAINING

The DIT may be asked to complete additional training at the discretion of the DSO. Any dive plan must contain sufficient detail for the DSO to determine which additional training will be required as necessary for a given research project or program.

Section Five:
DIVING EQUIPMENT

5.1 GENERAL POLICY

5.1.1 STANDARDS

All equipment shall meet standards as determined by the DSO and the DCB.

5.1.2 DIVER RESPONSIBILITY

All equipment shall be regularly examined by the user.

5.1.3 TRAINING IN EQUIPMENT USE

The diver shall be adequately trained to use all equipment.

5.1.4 ROUTINE INSPECTION REQUIRED TO MAINTAIN PERMIT

Equipment shall be inspected and serviced as needed. (see section 3.41D)

5.2 EQUIPMENT INSPECTION REQUIREMENTS

Equipment that is subjected to extreme conditions or heavy use will require more frequent testing and maintenance than listed below.

5.2.1 REGULATORS

Scuba regulators shall be inspected and tested prior to first use and every twelve months thereafter.

5.2.2 CYLINDERS AND VALVES

5.2.2.1 Scuba cylinders shall be designed, constructed, and maintained in accordance with the applicable provisions of the Unfired Pressure Vessel Safety Orders

5.2.2.2 Scuba cylinders must be hydrostatically tested in accordance with Department of Transportation standards (every 5 years)

5.2.2.3 Scuba cylinders must have an internal inspection at intervals not to exceed twelve months

5.2.2.4 Scuba cylinder valves shall be functionally tested at intervals not to exceed twelve months.

5.2.3 PRESSURE GAUGES

Pressure gauges shall be inspected and tested prior to the first use and every twelve months thereafter. Inaccurate gauges shall not be used.

5.2.4 BUOYANCY COMPENSATORS AND DRYSUITS

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

5.2.5 BACKPACK

Cylinder backpacks shall be inspected and tested prior to first use and every twelve months thereafter.

5.2.6 OTHER DIVING EQUIPMENT

All other equipment, *e.g.*, timing devices, depth gauges, and free-diving equipment shall be in good working order.

5.3 UNDERWATER POWER TOOLS

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

5.4 RECORD KEEPING

Each equipment modification, repair, test, calibration, or maintenance service shall be logged. The Diving Safety Program records shall include the date and nature of work performed, serial number of the item, and the name of the person performing the work.

5.5 UNIVERSITY AIR COMPRESSORS

All air compressor intakes shall be located away from areas containing exhaust or other contaminants.

5.5.1 LOW-PRESSURE COMPRESSORS

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

5.5.2 COMPRESSED AIR SYSTEMS OVER 500 PSIG

Compressed air systems over 500 psig shall have slow-opening shut-off valves.

5.5.3 COMPRESSOR OPERATION AND AIR TEST RECORDS

5.5.3.1 Gas analyses and gas tests shall be performed on breathing gas 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 maintained.

5.5.3.2 A log shall be maintained showing operation, repair, overhaul, filter maintenance, and temperature adjustment for each compressor.

5.5.3.3 Diver's gas fill station gauges will be calibrated annually by a certified calibration agency or vendor. Each gauge will be marked with a label, tag or sticker indicating the date of calibration and date due for calibration. Gauge calibration documentation received from the calibration source will be maintained by the DSO until the next calibration.

Section Six:
BREATHING AIR

6.1 AIR QUALITY STANDARDS

Breathing gas 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	500 PPM/v
Condensed Hydrocarbons	5 mg/m3
Water Vapor	NS
Objectionable Odors	None

It shall be the responsibility of the individual diver to assure that the air the diver uses is from an OSHA approved source or meets the specifications above.

Section Seven:
NITROX USE

7.1 NITROX GUIDELINES

7.1.1 ELIGIBILITY

Only a certified scientific diver or scientific diver-in-training (DIT), under the auspices of USC, is eligible to engage in nitrox (also known as enriched air or EANx) dive training and/or operations.

7.1.2 REQUIREMENTS FOR SCIENTIFIC NITROX DIVER

The individual must hold an active scientific diver or DIT permit including current medical examination, emergency care training, and demonstrate to the DSO and DCB an acceptable level of proficiency in necessary skills and theory relevant to nitrox diving. Prospective nitrox divers shall demonstrate open-water skill and knowledge adequate for conditions where dive operations will take place.

7.1.3 REQUIREMENTS TO USE NITROX

Submission of documents does not automatically result in nitrox use authorization. The candidate must convince the DSO and members of the DCB that the diver is sufficiently skilled and proficient to be certified. The skills will be acknowledged by the signature of the DSO on the certification form. After completion of nitrox training and evaluation, nitrox diving certification may be denied to any applicant who does not demonstrate, to the satisfaction of the DSO and DCB, the appropriate judgement and/or proficiency to ensure the safety of the diver and dive partner.

7.1.4 DOCUMENTATION

The applicant will provide to the DSO for review by the DCB:

7.1.4.1 A completed application form

7.1.4.2 Proof of scientific diver, or diver-in-training status

7.1.4.3 Proof of successful completion of a nitrox user course, both classroom and open-water sections. (see section 7.30)

7.1.5 EXAMINATIONS

Each prospective nitrox diver shall demonstrate additional theoretical and practical proficiency beyond scientific diver air certification level in examinations covering:

7.1.5.1 Written examinations covering the information presented in the classroom session(s)

7.1.5.2 Practical examinations covering the information presented in the practical training session(s)

7.1.5.3 Two (2) open water dives with the DSO or designee to demonstrate the application of theoretical and practical skills.

7.1.6 CERTIFICATION MAINTENANCE

In addition to standards set forth in section 3.41 at least one (1) nitrox dive must be logged every six (6) months. Failure to meet this criteria may be cause for revocation or restriction of nitrox use authorization.

7.2 NITROX DIVING REGULATIONS

7.2.1 DIVE PERSONNEL REQUIREMENTS

7.2.1.1 *Nitrox Diver-In-Training:*

A Diver-In-Training, who has completed the requirements of section 3.21A, B, C, D, and G of this manual may be authorized by the DSO to use nitrox under the direct supervision a scientific diver who also holds nitrox authorization. Dive depths shall be restricted to those specified on the diver's permit.

7.2.1.2 *Scientific Diver:*

A Scientific Diver who has completed all of the requirements detailed in section 3.21 of this manual may be authorized by the DSO to use nitrox. Depth authorization to use nitrox shall be the same as those specified on the diver's permit. (see section 3.30)

7.2.1.3 *Lead Diver:*

The lead diver must be authorized to use nitrox on any dive during which nitrox will be used by any team member, and hold appropriate authorizations required for the dive. (see section 2.22) Nitrox use shall be detailed in the dive plan.

In addition to responsibilities listed in section 2.22, the lead diver shall:

7.2.1.3.1 As part of the dive planning process, verify that all divers using nitrox on a dive are properly qualified and authorized

7.2.1.3.1 As part of the pre-dive procedures, confirm with each diver the nitrox mixture the diver is using, and establish dive team maximum operating depth (MOD) and time limits, according to the shortest time limit or shallowest depth limit among the team members

7.2.1.3.1 The lead diver shall also reduce the maximum allowable PO_2 exposure limit for the dive team if on-site conditions so indicate. (see section 7.22A3)

7.2.2 DIVE PARAMETERS

7.2.2.1 *Dive Limitations:*

7.2.2.1.1 Planned decompression dives must be approved by the DCB.

7.2.2.1.2 If using the equivalent air depth (EAD) method, the maximum depth of a dive shall be based on the partial pressure of the oxygen for the specific breathing mixture to be used. The oxygen partial pressure experienced at depth shall not exceed 1.5 ATA.

7.2.2.1.3 If the dive is anticipated to be cold and/or arduous the maximum partial pressure of oxygen shall not exceed 1.4 ATA oxygen.

7.2.2.3 *Bottom Time Limitations:*

7.2.2.3.1 Maximum bottom time shall be based on the depth of the dive and the breathing mixture being used.

7.2.2.3.2 Bottom time of dives shall not exceed the NOAA maximum allowable “Single Exposure Limit” for a given partial pressure of oxygen. (see section 7.23B)

7.2.2.3 *Decompression Models and Gasses*:

7.2.2.3.1 Decompression models must be approved by the DCB.

7.2.2.3.2 Nitrox compatible computers may be used with approval from the DSO. (see section 7.22D)

7.2.2.3.3 It is the responsibility of each individual diver to determine their own decompression obligation, EAD, MOD and CNS limit for the oxygen content of the cylinder(s) they use.

7.2.2.3.4 Gases shall be analyzed for oxygen content to an accuracy of ±1% total. This analysis shall be performed both by the person preparing the mixture and by the diver.

7.2.2.3.5 Gas mixtures standing more than 24 hrs. shall be reanalyzed.

7.2.2.3.6 When using NOAA Nitrox-I (32% O_2 / 68% N_2) or NOAA Nitrox-II (36% O_2 / 64%N_2), decompression tables and procedures used shall be approved by the DCB.

7.2.2.3.7 When using Nitrox Dive Tables, the analyzed FO_2 of the mixture specified may exceed the mix specified by the table as long as the diver does not exceed the MOD for that specific mix. (i.e. A diver may use a 36% O_2 mix with a table specifying a 32% O_2 mix as this is a more conservative usage of the table.)

7.2.2.3.8 If nitrox is used to increase the safety margin of air-based dive tables, the lead diver shall ensure that the MOD, oxygen exposure and time limits for the nitrox mixture being dived are not exceeded.

7.2.2.3.9 Breathing mixtures used while performing in-water decompression, or for bail-out purposes, shall contain the same or greater oxygen content as that being used during the dive, within the confines of depth limitations (see section 3.30) and the oxygen partial pressure limits (see section 7.22A).

7.2.2.4 *Nitrox Compatible Dive Computers:*

7.2.2.4.1 Dive Computers as approved by the DCB may be used to compute decompression status during nitrox dives. Manufacturers' guidelines and operations instructions should be followed.

7.2.2.4.2 Use of nitrox dive computers shall comply with dive computer guidelines. (see Appendix M)

7.2.2.4.3 Dive computer users shall demonstrate a clear understanding of the display, operations, and manipulation of the unit being used prior to using the computer, to the satisfaction of the DSO or designee.

7.2.2.4.4 If nitrox is used to increase the safety margin of an air-based dive computer, the lead diver shall ensure that the MOD, oxygen exposure and time limits for the nitrox mixture being used are not exceeded.

7.2.2.4.5 Dive computers capable of PO_2 limit and FO_2 adjustment shall be checked

by the diver prior to the start each dive to assure compatibility with the mix being used.

7.2.2.5 *Repetitive Diving:*

7.2.2.5.1 Repetitive diving using nitrox shall be performed in compliance with procedures required of the specific decompression model used.

7.2.2.5.2 Residual nitrogen time shall be based on the EAD for the specific mixture being used for the repetitive dive and not on that of the previous dive.

7.2.2.5.3 The total exposure to a partial pressure of oxygen in a given 24 hour period shall not exceed the "Total Exposure per Twenty-four (24) Hour Period". (see section 7.23B)

7.2.2.5.4 The recommended minimum surface interval time between repetitive nitrox dives shall be one hour.

7.2.2.5.5 When doing repetitive dives with different mixtures always use the mix that gives the deepest EAD first, the next shallower second, etc.

7.2.3 OXYGEN PARAMETERS

7.2.3.1 *Authorized Mixtures:*

7.2.3.1.1 The following two enriched air mixtures will provide adequate bottom times for most dives between 60 and 130 feet and are recommended for standard use.

NOAA Nitrox-I:
68% Nitrogen : 32% Oxygen

NOAA Nitrox-II:
64% Nitrogen : 36% Oxygen

7.2.3.1.2 Other mixtures of greater than 21% oxygen, meeting the criteria outlined in section 7.41 may be used for nitrox diving operations upon approval of the DSO. There are special requirements for equipment that is used with oxygen percents higher than 40% by volume.

7.2.3.2 *Oxygen Limits (CNS Limit):*

All dives performed using enriched air breathing mixtures shall comply with the following NOAA Oxygen Partial Pressure Limits for "normal" exposures as listed in the NOAA manual. (*NOAA Diving Manual*. 1991. US Department of Commerce. 380pp.)

Oxygen Max PO_2 (ATA)	Single Exposure Limit (hrs)	24 Hour Limit (hrs)
1.60	0.75	2.5
1.50	2.0	3.0
1.40	2.5	3.0
1.30	3.0	3.5
1.20	3.5	4.0
1.10	4.0	4.5
1.00	5.0	5.0
0.90	6.0	6.0
0.80	7.5	7.5
0.70	9.5	9.5
0.60	12.0	12.0

7.2.4 GAS MIXING AND ANALYSIS

7.2.4.1 *Personnel Requirements:*

Individuals responsible for blending and analyzing mixtures shall be trained, have proof of certification and experience in all aspects of the technique. Only those individuals approved by the DCB shall be responsible for blending mixtures.

7.2.4.2 *Mixing Methods:*

It is the responsibility of the DCB designee to approve which of the various methods of blending and oxygen analyzing is utilized.

7.2.4.3 *Purity Standards :*

Oxygen used for mixing nitrox shall meet the purity levels for "Medical Grade" (USP) standards.

7.2.5 ANALYSIS VERIFICATION

Any cylinder marked for nitrox use must be analyzed prior to a dive. It is the responsibility of each diver to analyze prior to the dive the oxygen content of their scuba cylinder and acknowledge, in writing the following information:

- The percents of oxygen (±1%) and nitrogen
- The Maximum Operating Depth (MOD) for the mix
- The cylinder pressure
- The date of analysis
- The diver's signature and initials
- The cylinder serial number (on validation sheet)
- Individual dive logs must include FO_2 if other than 21%.

7.3 GUIDELINES FOR TRAINING OF NITROX SCIENTIFIC DIVERS

7.3.1 TRAINING

The training shall be supplemental to the training requirements for air diving in this manual and consist of additional training specific to nitrox diving.

7.3.1.1 *Class Instruction:*

Minimum of four (4) hours. Topics shall include at least: a review of previous training, gas laws, partial pressures (limits and calculations), EAD concept and calculation, oxygen toxicity both CNS and pulmonary, MOD and calculation, determination of decompression status using both the EAD method with approved air tables and approved nitrox tables, dive planning, blending procedures, calculations for producing specific mixes, gas analysis, oxygen cleaning, personnel and dive station requirements, safety procedures, emergency procedures to include recompression chamber location, availability, evacuation plans and transport.

7.3.1.2 *Practical Training:*

The practical portion of the training shall consist of a review of skills as stated in section four of the manual with the following additional training:

7.3.1.2.1 Calculations of the EAD, MOD, cylinder pressure, CNS percentages, and partial pressures for various enriched air mixtures at various depths

7.3.1.2.2 Oxygen analysis of nitrox mixtures

7.3.1.2.3 A minimum of two (2) open water nitrox dives with the DSO or designee. If these dives are conducted in a location where the MOD may be easily exceeded, the ratio of supervisory personnel to divers shall be 1:1.

7.3.1.3 *Written Examination:*

Before completion of nitrox use training the trainee must successfully pass a written examination.

7.4 NITROX DIVING EQUIPMENT

7.4.1 REQUIRED EQUIPMENT

7.4.1.1 *Dedicated Cylinders:*

Dedicated cylinders, both storage and scuba, shall be oxygen clean and compatible. The cylinders are restricted for use with nitrox or oil free air only. Cylinders not so designated or prepared shall not be used with nitrox mixtures. Scuba cylinders to be used with nitrox mixtures shall have the following identification documentation affixed to the cylinder:

7.4.1.1.1 Cylinders shall be clearly marked “NITROX”, “EANx” or “Enriched Air”

7.4.1.1.2 Nitrox identification color coding shall include a 4-inch wide green band around the cylinder, starting immediately below the shoulder

curvature. If the cylinder is not yellow in color the green band shall be bordered above and below by a 1-inch yellow band

7.4.1.1.3 The alternate marking of a yellow cylinder by painting the cylinder crown green and printing the word "NITROX" parallel to the length of the cylinder in green print is acceptable

7.4.1.1.4 Contents shall be labeled on the cylinder and include the current FO_2, cylinder pressure, date of analysis, MOD and user's initials

7.4.1.1.5 The visual cylinder inspection record shall indicate whether the cylinder is prepared for oxygen or nitrox mixtures containing greater than 40% oxygen.

7.4.1.2 *Dedicated Regulators:*

When using a nitrox mixture containing more than 40% oxygen the diver must also use an oxygen clean and compatible regulator. The regulator shall be marked for nitrox use only. Dedicated regulators used with cylinders filled by an oil lubricated compressor cannot be used with mixtures over 40% until they have been cleaned.

7.4.1.3 *Oxygen Analyzers:*

An oxygen analyzer capable of determining the oxygen content in the diver's cylinder prior to diving is required. The analyzer must be accurate to within 1% of the total. The use of two analyzers in parallel is recommended for comparative and verification purposes.

7.4.1.4 *Oil-Free Compressor:*

The compressor/filtration system must produce oil-free air. An oil free compressor is strongly recommended when producing nitrox from compressed air and oxygen.

7.4.1.5 *Fill Station:*

All components of a nitrox fill station which will contact nitrox mixtures containing greater than 40% oxygen shall be cleaned, maintained, and labeled for oxygen service.

7.4.1.6 *Diver Worn Support Equipment:*

All diver-worn and support equipment used (in contact) with high pressure oxygen or oxygen mixtures greater than 40% by volume should be prepared, maintained, and designated for oxygen service in compliance with ASTM Pamphlet G88-84, "Designing Systems for Oxygen Service." A copy of this document will be on file with the Diving Safety Program.

7.4.1.7 *Other Equipment:*

All other diving and auxiliary equipment shall cleaned, maintained, and stored in compliance with this manual.

7.5 BREATHING GAS STANDARDS

Air from a compressor used for nitrox blending must meet or exceed these "oil free air" standards for purity:

Carbon Monoxide	<10 ppm
Carbon Dioxide	<500 ppm
Gaseous hydrocarbon (methane)	<25 ppm
Condensed hydrocarbons	0.0 mg/M
Moisture / water vapor dew point	<-40˚C
Solid / particulate matter	<1 micron

Section Eight:
PROCEDURES FOR EMERGENCY CARE

8.1 INTRODUCTION

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.

8.2 GENERAL PROCEDURES

Depending on and according to the nature of the diving accident, stabilize the patient, administer 100% oxygen, contact local Emergency Medical System (EMS) for transport to medical facility, and contact diving accident coordinator, as appropriate. Explain the circumstances of the dive accident 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.

8.2.1 Make appropriate contact with the victim or rescue as required

8.2.2 Establish (A)irway, (B)reathing, (C)irculation as required

8.2.3 Administer 100% oxygen, if appropriate (in cases of decompression illness or near drowning)

8.2.4 Call local Emergency Medical System (EMS) for transport to nearest medical facility

8.2.5 Call appropriate diving accident coordinator for contact with diving physician, Diver's Alert Network, recompression chamber, etc.

8.2.6 Notify DSO or designee as soon as possible

8.2.7 Complete and submit accident/incident report form (see Appendix L) to the DCB.

All proposed diving projects shall include pre-planned emergency procedures. (see section 2.13E)

8.3 REPORTING

All accidents, incidents, equipment failures, or potentially dangerous situations must be reported to the DSO on the appropriate forms. All accidents requiring hyperbaric treatment shall be reported to AAUS. (see Appendix L)

Section Nine:
USC WRIGLEY INSTITUTE FOR ENVIRONMENTAL STUDIES

9.1 GENERAL

The University of Southern California recognizes that the majority of diving done under its auspices is conducted at the Wrigley Institute for Environmental Studies (WIES). As such this manual contains some regulations particular to the Institute (detailed below). All diving done at WIES shall follow the provisions outlined in this manual.

9.2 EMERGENCY PROCEDURES

Due to the proximity of the Catalina Hyperbaric Chamber, diving emergency procedures differ somewhat at WIES.

At WIES: Immediately contact Baywatch Isthmus (911 or 510-0341 or VHF channel 16), do not break contact until told to do so. Either they will or you will be instructed to contact a Catalina Hyperbaric Chamber Crew member (510-1053 or 6-4027). The red emergency phone on the pier will automatically ring the chamber emergency line when the receiver is picked up. State that you have a diving emergency, and do not hang up until told to do so. (see section 8)

Any accident or incident occurring under University of Southern California auspices must be reported. (see section 2.16)

9.3 ON-SITE OXYGEN REQUIREMENT

The on-site oxygen requirement (see section 2.26F) is met by the Catalina Hyperbaric Chamber when diving is conducted within the small boat boundaries. (see Appendix I)

9.4 SMALL BOAT USE

The USC Wrigley Institute for Environmental Studies has several small boats available for use on a reservation basis. All boat operators must complete the qualification requirements established by the DSO to be qualified to operate any of the WIES boats. Small boat operations will be conducted within the small boat boundaries (see Appendix I) unless the DSO has authorized vessel use outside these boundaries. Vessels may not be operated by anyone who has not been certified by the DSO as a small boat operator.

9.5 GAME TAKING

The possession of any algae, plant or animal is prohibited in the WIES Marine Life Refuge. The boundaries of the refuge extend from Chalk Cliffs seaward past Big Fisherman Cove and around the north headland to Blue Cavern Point. (see Appendix I) Anyone who holds valid Fish and Game permits for scientific collection and is approved by the Director of the WIES Marine Life Refuge may collect marine life in the refuge area.

Any violation of this restriction will result in a written reprimand and suspension from the diving program.

APPENDICIES

A. Program Application and Resume of Diving Experience

B. Medical Evaluation of Fitness for Scuba Diving

C. Medical History Form

D. USC Waiver and Release Form

E. Research Diving Activity Form

F. AAUS Reciprocity Form

G. Scientific Diver Certification Protocol for Experienced Divers

H. USC Temporary Diving Permit Application

I. Wrigley Institute for Environmental Studies Small Boat Boundaries

J. USC Approved Decompression Models

K. USC Dive Log

L. USC Accident/Incident Report Form

M. Dive Computer Use Guidelines

N. Definition of Terms

APPENDIX A

University of Southern California

APPLICATION FOR DIVING UNDER USC AUSPICES

PLEASE PRINT Date_____

NAME: Last First Initial Social Security # Birthdate/Age Sex

LOCAL ADDRESS: Street City State Zip Phone# e-mail

PERMANENT ADDRESS: Street City State Zip Phone# e-mail

_____ _____
HEALTH INSURANCE PROVIDER DIVING INSURANCE

_____
BOARD OF STUDIES/RESEARCH GROUP

UNDERGRADUATE/GRADUATE/STAFF/FACULTY/OTHER (explain) **(circle one)**

University of Southern California Scientific Diver certification allows the use of scuba by those whom need this tool for their work or study. Only persons with demonstrated need for this certification will be eligible.
STATE YOUR NEED FOR UNIVERSITY SCIENTIFIC DIVER CERTIFICATION (use additional space if necessary):

_____

_____

_____

The applicant agrees that all diving under the auspices of the University of Southern California WIES will be carried out in accordance with the regulations set forth in the University of Southern California Diving Safety Manual. Violation of any regulation may result in revocation or restriction of certification.

APPLICANT SIGNATURE_____

Students:_____ _____
Print name of Chair/Major advisor Board of studies

Faculty/Staff/non-students:_____ _____
Supervisor/agency administrator Department

Name of Person(s) to contact in case of emergency:

_____
Name Relation Address

_____
Phone Number Fax and/or other contact information

_____
Name Relation Address

_____
Phone number Fax and/or other contact information

DIVING SAFETY OFFICER APPROVAL/COMMENTS:

APPENDIX A

RESUME OF DIVING EXPERIENCE:

ENTRY LEVEL CERTIFICATION: (please include a copy of both sides of your c-card)

_____
(Organization) (Date certified) (Where training was conducted)

Number of dives since basic certification (approximately): _____
Maximum depth _____
Average depth _____

Number of dives in the past 12 months (if none, when did you conduct your last scuba dive?) _____

Additional Diving Certifications:

Certification level	Year certified	Agency
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Rescue, CPR, Oxygen or First Aid Training:

Type of Certification	Date Completed	Organization
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Swimming experience:

years_____

Type of Certification	Date Completed	Organization
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

DIVING EXPERIENCE:

Briefly list the geographic areas and types of environments in which you have dived:

Briefly describe the nature of your diving (i.e. photography, research, touring etc.):

Diving related work experience:

Do you have any special requirements pertaining to diving? If so, please describe them:

APPENDIX B

DIVING MEDICAL EXAM OVERVIEW FOR THE EXAMINING PHYSICIAN

TO THE EXAMINING PHYSICIAN:

This person, _____, requires a medical examination to assess his/her fitness for certification as a Scientific Diver for the University of Southern California. 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 scuba Diving Fitness Medical Evaluation Report. If you have questions about diving medicine, you may wish to consult one of the references on the attached list or contact one of the physicians with expertise in diving medicine whose names and phone numbers appear on an attached list. Please contact the undersigned Dive Safety Officer if you have any questions or concerns about diving medicine or the University of Southern California standards. Thank you for your assistance.

_____ _____
Dive Safety Officer Date

_____ _____
Printed Name Phone Number

Scuba and other modes of compressed-gas diving can be strenuous and hazardous. A special risk is present if the middle ear, sinuses or lung segments do not readily equalize air pressure changes. The most common cause of distress is eustachian insufficiency. Most fatalities involve deficiencies in prudence, judgement, emotional stability or physical fitness. Please consult the following list of conditions which usually restrict candidates from diving.

(Adapted from Bove, 1998: 61 -63, 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[1]. [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]

APPENDIX B

22. History of spontaneous or traumatic pneumothorax. [45]
23. Asthma[2]. [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]

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

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

SELECTED REFERENCES IN DIVING MEDICINE

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

ACC/AHA Guidelines for Exercise Testing. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Exercise Testing). Gibbons RJ, et al. 1997. Journal of the American College of Cardiology. 30:260-311.
http://www.acc.org/clinical/guidelines/exercise/exercise.pdf

Alert Diver Magazine; Articles on diving medicine
http://www.diversalertnetwork.org/medical/articles/index.asp

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

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

DIVING MEDICINE, Third Edition, 1997. A. Bove and J. Davis. W.B. Saunders Company, Philadelphia

DIVING AND SUBAQUATIC MEDICINE, Third Edition, 1994. C. Edmonds, C. Lowery and J. Pennefather. Butterworth-Heinemann Ltd. Oxford

MEDICAL EXAMINATION OF SPORT SCUBA DIVERS, 1998. Alfred Bove, M.D.,Ph.D. (ed.). Medical Seminars, Inc. San Antonio, TX

NOAA DIVING MANUAL, NOAA. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

U.S. NAVY DIVING MANUAL. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

APPENDIX B

MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING REPORT

_____ _____
Name of Applicant (Print or Type) Date(Mo/Day/Year)

To The PHYSICIAN:

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

TESTS: Please initial that the following tests were completed.

[ ] Initial Examination

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

[ ] Re-examination (Every 5 years under age 40, or first exam over age 40, every 3 years over age 40, every 2 years over age 60)

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

Additional testing for first over age 40

_____ Resting EKG
_____ Assessment of coronary artery disease using Multiple-Risk-Factor Assessment[1] (age, lipid profile, blood pressure, diabetic screening, smoker)

Additional testing for over age 40

_____ Resting EKG
_____ Assessment of coronary artery disease using Multiple-Risk-Factor Assessment[1] (age, lipid profile, blood pressure, diabetic screening, smoker)

Note: Exercise stress testing may be indicated based on risk factor assessment [2]

RECOMMENDATION:

[ ] APPROVAL. I find no medical condition(s) which I consider incompatible with diving.

[ ] RESTRICTED ACTIVITY APPROVAL. The applicant may dive in certain circumstances as described in REMARKS.

[ ] FURTHER TESTING REQUIRED. I have encountered a potential contraindication to diving. Additional medical tests must be performed before a final assessment can be made. See **REMARK**S.

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

OVER

APPENDIX B

[1]"Assessment of Cardiovascular Risk by Use of Multiple-Risk-Factor Assessment Equations." Grundy et. al. 1999. AHA/ACC Scientific Statement. http://www.acc.org/clinical/consensus/risk/risk1999.pdf
[2]Gibbons RJ, et al. ACC/AHA Guidelines for Exercise Testing. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Exercise Testing). Journal of the American College of Cardiology. 30:260-311, 1997. http://www.acc.org/clinical/guidelines/exercise/exercise.pdf

REMARKS:

_____
_____
_____
_____
_____

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

_____ M.D.
Date Signature

_____
Name (Print or Type)

_____
Address

_____
Telephone Number

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

_____
My familiarity with diving medicine is:

_____
_____

APPLICANT'S RELEASE OF MEDICAL INFORMATION FORM
I authorize the release of this information and all medical information subsequently acquired in association with my diving to the University of Southern California Dive Safety Officer and Diving Control Board or their designee at (place)_____ on (date)_____.

Signature of Applicant _____

APPENDIX C

DIVING MEDICAL HISTORY FORM

(To Be Completed By Applicant-Diver)

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

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

TO THE APPLICANT:

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

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

This form shall be kept confidential. If you believe any question amounts to invasion of your privacy, you may elect to omit an answer, provided that you shall subsequently discuss that matter with your own physician and he/she 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, his/her 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 he/she is concerned only with your well-being and safety. Please respect the advice and the intent of this medical history form.

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

APPENDIX C

Have you ever had or do you presently have any of the following?	Yes	No	Comments
18. Difficulty with exercise.			
19. High blood pressure			
20. Collapsed lung			
21. Asthma.			
22. Other lung disease.			
23. Diabetes mellitus.			
24. Pregnancy			
25 Surgery If yes explain below			
26. Hospitalizations. If yes explain below			
27. Do you take any medications? If yes list below			
28. Do you have any allergies to medications, foods, environmentals? If yes explain below			
29. Do you smoke?			
30. Do you drink alcoholic beverages?			
31. Is there a family history of high cholesterol?			
32. Is there a family history of heart disease or stroke?			
33. Is there a family history of diabetes?			
34. Is there a family history of asthma?			

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

_____
_____
_____
_____
_____
_____
_____

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

_____

Signature Date

APPENDIX D

USC Waiver and Release of Liability

FROM: (print name): _____

TO: The University of Southern California, University Park, Los Angeles, CA 90007

ATTENTION: Director, USC Wrigley Institute for Environmental Studies

I hereby apply for permission to engage in compressed gas diving under University of Southern California auspices.

I acknowledge that in the event such permission is granted it will be granted to me as a voluntary diver. I am participating in this activity with full knowledge of the risks inherent in compressed gas diving and I hereby agree to accept any and all risks associated with this activity. I hereby acknowledge and affirm that I am not required to participate in compressed gas diving as a condition to obtaining any academic degree. I further acknowledge that I am not to be considered an employee of the University, and that no benefits customarily afforded to employees, will be extended to me by virtue of participation in compressed gas diving. As an individual who actual IS employed by the University in a capacity unrelated to compressed gas diving, I acknowledge that participating in compressed gas diving is not a condition of my employment.

I CERTIFY THAT I HAVE READ, FULLY UNDERSTAND AND AGREE TO ABIDE BY THE UNIVERSITY OF SOUTHERN CALIFORNIA COMPRESSED GAS DIVING REGULATIONS AS SET FORTH IN THE DIVING SAFETY MANUAL.

In consideration of being granted permission as herein requested, I hereby waive and relinquish any right, claim or cause of action which I or my heirs or personal representative may in the future have against the University, its officers, agents and employees, the USC Wrigley Institute for Environmental Studies, any member, associate, employee or agent thereof, for any injury, no matter how serious and whether or not resulting in death, and/or destruction of any personal property, regardless of how or by whom such injury or damage is caused, which results from my participation in compressed gas diving (including travel to and from the site of such diving) .

I do not intend by this instrument to waive or relinquish any claim against any individual arising out of his/her intentional act or willful negligence but in the event such individual is determined to be an agent of the University of Southern California, I do hereby waive and relinquish any claim against the University as a principal.

NOTE: This instrument is a waiver of your legal right to collect damages in the event of your injury or death and in the event of damage or destruction of your personal property. If you do not understand this instrument you are advised to consult an attorney.

IN WITNESS THEREOF, I HAVE EXECUTED THIS INSTRUMENT THIS _____ DAY OF _____, 200___.

ADDRESS: _____

SIGNATURE: _____

WITNESSED BY (please print): _____

ADDRESS: _____

SIGNATURE: _____

APPENDIX D

RELEASE FROM LIABILITY

(University of Southern California)

I, the undersigned, acknowledge and agree that in consideration for permission to participate in the Activities (defined below), I voluntarily indemnify, release from liability and hold harmless the University of Southern California, The USC Wrigley Institute for Environmental Studies and any organization affiliated therewith, including all of their respective agents, employees, administrators, representatives, officers, students and assigns (collectively, "USC"), for any injury, illness, death, loss or damage to person or property that I may suffer in connection with any activities in which I may engage on, about or by access through any property owned, operated or managed by USC (whether permitted or not permitted by USC), including without limitation, activities such as swimming, diving, snorkeling, scuba diving, surfing, wading or boating (collectively, the "Activities"). I acknowledge and agree that this release applies to all claims for any injury, illness, death, loss or damage that I may suffer, financial or otherwise, whether known or unknown, or foreseen or unforeseen, in connection with the Activities. I am aware of the provisions of Section 1542 of the California Civil Code, which Section reads as follows:

> "A general release does not extend to claims which the creditor does not know or suspect to exist in his favor at the time of executing the release, which if known by him must have materially affected his settlement with the debtor."

I hereby waive the provisions of Section 1542 of the California Civil Code and the provisions of any similar laws of any other state or country. I agree that I, my spouse, assignees, heirs, guardians, and legal representatives will not make any claim against, sue or attach the property of USC for any loss or damage resulting from my participation in the Activities. I understand that none of the Activities are endorsed, sanctioned, guaranteed, supervised or monitored by USC.

I acknowledge and affirm that I am not required to participate in any of the Activities as a condition to obtaining any academic degree. I further acknowledge and affirm that I am not to be considered an employee of USC and that no benefits customarily afforded to employees of USC, will be extended to me by virtue of my participation in the Activities. As an individual who actually IS employed by USC in a capacity unrelated to the Activities. I acknowledge that participating in the Activities is not a condition of my employment.

I HAVE CAREFULLY READ THIS AGREEMENT AND FULLY UNDERSTAND ITS CONTENTS. I AM AWARE THAT THIS IS A RELEASE OF LIABILITY, A WAIVER OF MY LEGAL RIGHT TO COLLECT DAMAGES IN THE EVENT OF INJURY, DEATH OR PROPERTY DAMAGES AND A CONTRACT BETWEEN MYSELF AND USC AND SIGN IT OF MY OWN FREE WILL.

WARNING! THERE ARE OBVIOUS KNOWN DANGERS INHERENT IN UNDERTAKING THE ACTIVITIES. FOR EXAMPLE: RISK OF SEVERE INJURIES DUE TO WATER TEMPERATURE, BOAT ACCIDENTS, DROWNING, WEATHER AND OCEAN CURRENTS AND CONDITIONS, CONTACT WITH MARINE ORGANISMS, EQUIPMENT FAILURE, HAZARDOUS OCEAN BOTTOM TOPOGRAPHY, THIRD-PARTY LIABILITY, CRIMINAL ACTIVITY AND DEATH.

SIGNATURE: _____ DATE: _____

NAME (PRINT): _____

WITNESSED BY (PRINT): _____

SIGNATURE: _____

APPENDIX E

RESEARCH DIVING ACTIVITY FORM
(310) 510-4022 ph./(310) 510-1364 FAX
University of Southern California

Anticipated Project start date_____ **end date**_____

Name **(Project Director)**_____

Contact information: Phone FAX e-mail

University Status (circle one): Faculty Staff Graduate Undergraduate Visiting Researcher

Name **(lead diver)**_____Certification depth:_____

University Status (circle one): Faculty Staff Graduate Undergraduate Visiting Researcher

Faculty or University affiliated sponsor (if appropriate):_____

Name(s) dive buddies:	USC certification depth or	Other Institution affiliation
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Please outline your research project, focusing on the diving aspect of the research. Include the following:

Breathing gas supply and mode. Air/Nitrox/Other Scuba/Surface Supply/Other

Decompression status indicator used. Tables Computer (List make)_____

Diver thermal protection. Wetsuit/Drysuit/Other

Emergency procedures you will follow (see section eight of the Diving Safety Manual) include emergency evacuation plans and names and numbers of persons to contact in the event of an emergency.

Dive profiles expected, including diving depths, bottom times and number of repetitive dives expected per day.

Appropriate out-of-air protocol to be used (dives deeper than 100 feet may require a redundant air source)

Diving conditions expected (visibility, wave exposure, wall diving etc., contaminants, currents). Please detail any potentially hazardous conditions.

Boat use and/or beach access plan.

Specialty equipment use (ie. scooters {DPVs}, lift bags, cameras, dredges, drills, cores, blue water rigs, etc.)

Sampling methods to be used (ie. transects/quadrats, collecting {explain collecting methods}, etc.)

Diving Safety Officer approval *DCB chairperson approval*

_____Date: _____Date:

APPENDIX F

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

A scientific diver that is currently certified under the auspices of an organizational member institution of the American Academy of Underwater Sciences (AAUS) shall be recognized by any other organizational member of AAUS and may apply for reciprocity in order to dive with the host organization. Organizational members that are in good standing with AAUS operate, at a minimum, under the AAUS Standards for Scientific Diving Certification and Operation of Scientific Diving Programs (1996 edition). The visiting diver will comply with the diving regulations of the host organization's Diving Safety Manual unless previously arranged by both organization's Diving Control Boards.

The host organization has the right to approve or deny this request and may require, at a minimum, a checkout dive with the Diving Safety Officer (DSO) or designee of the host organization. If the request is denied, the host organization should notify to the DSO of the visiting diver the reason for the denial. The DSO for the visiting scientific diver has confirmed the following information:

(Date)
_____ Written scientific diving examination
_____ Last diving medical examination
_____ Most recent checkout dive
_____ Scuba regulator/equipment service/test
_____ CPR training (Agency) _____
_____ Oxygen administration (Agency) _____
_____ First aid for diving _____
_____ Date of last dive
Number of dives completed within previous 12 months?_____
Depth certification_____
Any restrictions? (Y/N)_____ if yes, explain:
_____
Please check any pertinent specialty certifications:

_____ Dry suit	_____ Rescue	_____ Blue water
_____ Dive Computer	_____ Divemaster	_____ Altitude
_____ Nitrox	_____ Instructor	_____ Ice/Polar
_____ Mixed gas	_____ EMT	_____ Cave
_____ Closed circuit	_____ Dive Accident Management	_____ Night
_____ Saturation	_____ Chamber operator	_____ Other
_____ Decompression	_____ Lifesaving	

Name of diver: _____
Emergency Information: (To notify in an emergency)
Name:_____

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

Address:_____

This is to verify that the above individual is currently a certified scientific diver
Diving Safety Officer:

_____
(Signature) (Date)

_____ _____
(Print) (Telephone, FAX, Email)

APPENDIX G

USC
Scientific Diver Certification Protocol
For Experienced Divers

Divers certified as scuba divers through a nationally recognized training agency with a minimum of 50 logged dives may forego taking a USC Scientific Diver Certification Class with the approval of the Diving Safety Officer. All paperwork must be completed, including a written examination.

Divers who wish to forego taking a USC Scientific Diver Certification Class must demonstrate proficiency in the following skills during checkout dives or during training evaluation dives with the Diving Safety Officer or designee:

Knowledge:

___ Pass written exam covering theoretical aspects of scientific diving. Topics include diving physics, physiology, medicine, rescue, first aid, recompression, air tables, waves, currents, navigation, physical fitness, environment, subtidal marine life, research methods, life support equipment, and USC requirements and procedures.

General Skills:

___ Site evaluation
___ Proper gear check
___ Proper entry and exit

CONFINED WATER (at the discretion of the DSO):

___ Surface swim without swim aids (400 yds. < 10 min.)
___ Underwater swim without swim aids (25 yds. w/o surfacing)
___ Tread water without swim aids (10 min.)
___ Surface dive to a depth of 10 ft., recover a victim from the bottom, and transport the victim without swim aids (50 yds.)
___ Snorkeling gear ditch and recovery

OPEN WATER:

Snorkeling Gear only:

___ Demonstrate proper surface dives/ ascents
___ Surface dive demonstrating mask clears
___ Remove and replace weight belt
___ Tired diver assists (surface)
___ Rescue of non-breathing, unconscious diver including transport and exit to shore
___ Surface swim with full snorkeling gear (880 yds.)

Full Scuba Gear:

General Knowledge/Skills:

___ Pre-dive planning, briefing, site orientation, and buddy check
___ Proper use of decompression model (tables/ computer)
___ Equipment familiarity
___ Full scuba rescue
___ Underwater signs and signals
___ Proper entry and exit
___ Monitor cylinder pressure, depth, and bottom time
___ Calculate air consumption (expressed as SAC rate in cubic feet)
___ Proper buddy contact
___ Surface swim with full gear, not breathing from scuba (400 yds.)

Protocol for Scientific Diving
(Continued)

APPENDIX G

Full Scuba Gear:

Under Water:

___ Remove and replace equipment on surface
___ Proper ascent/ decent
___ Mask flood and clear
___ Regulator ditch and recovery
___ Out of air situation (both donor and recipient)
___ Simulated controlled emergency swimming ascent
___ Remove and replace weight belt at depth
___ Remove and replace power inflator hose
___ Neutral buoyancy (using manual and power inflation of the BC)
___ Underwater navigation
___ Simulate proper safety stop
___ Properly plan another repetitive dive using decompression model (dive need not be executed, only planned)
___ Other, as discussed with the Diving Safety Officer

APPENDIX H

USC TEMPORARY DIVING PERMIT APPLICATION

Name: _____ Date:_____

Period this application is to cover: _____

Proposed Dive Buddy: (must be an active scientific diver):_____

Purpose for diving: _____

Certification:
Agency_____ Level _____(attach copy of C card)

Diving Experience: (fill in number of dives in the following categories)

0-30 _____ 31-60 _____ 61-100 _____ 130+ _____

Total number of dives in the last 12 months: _____

Medical: Attach a completed copy of the USC Medical History Form
Attach a copy of the medical clearance for scuba diving signed by a licensed medical doctor and dated within one year of this request. (see Appendices B and C of the Diving Safety Manual)

USC Waiver: Submit with this Request a signed and witnessed USC Waiver/Release Form. (see Appendix D of the Diving Safety Manual)

I understand that when this temporary diving permit is approved that I am authorized to dive within the USC Diving Program for the period stated on this request. I also understand that I am allowed only two dives a day to a maximum depth of 40 feet during day light hours unless otherwise authorized by the Diving Safety Officer. I agree to comply with all USC Diving Program Regulations. I have read and understand the USC Diving Safety Manual.

_____ _____
Diver's Signature Date

_____ _____
Diving Control Board Approval Date

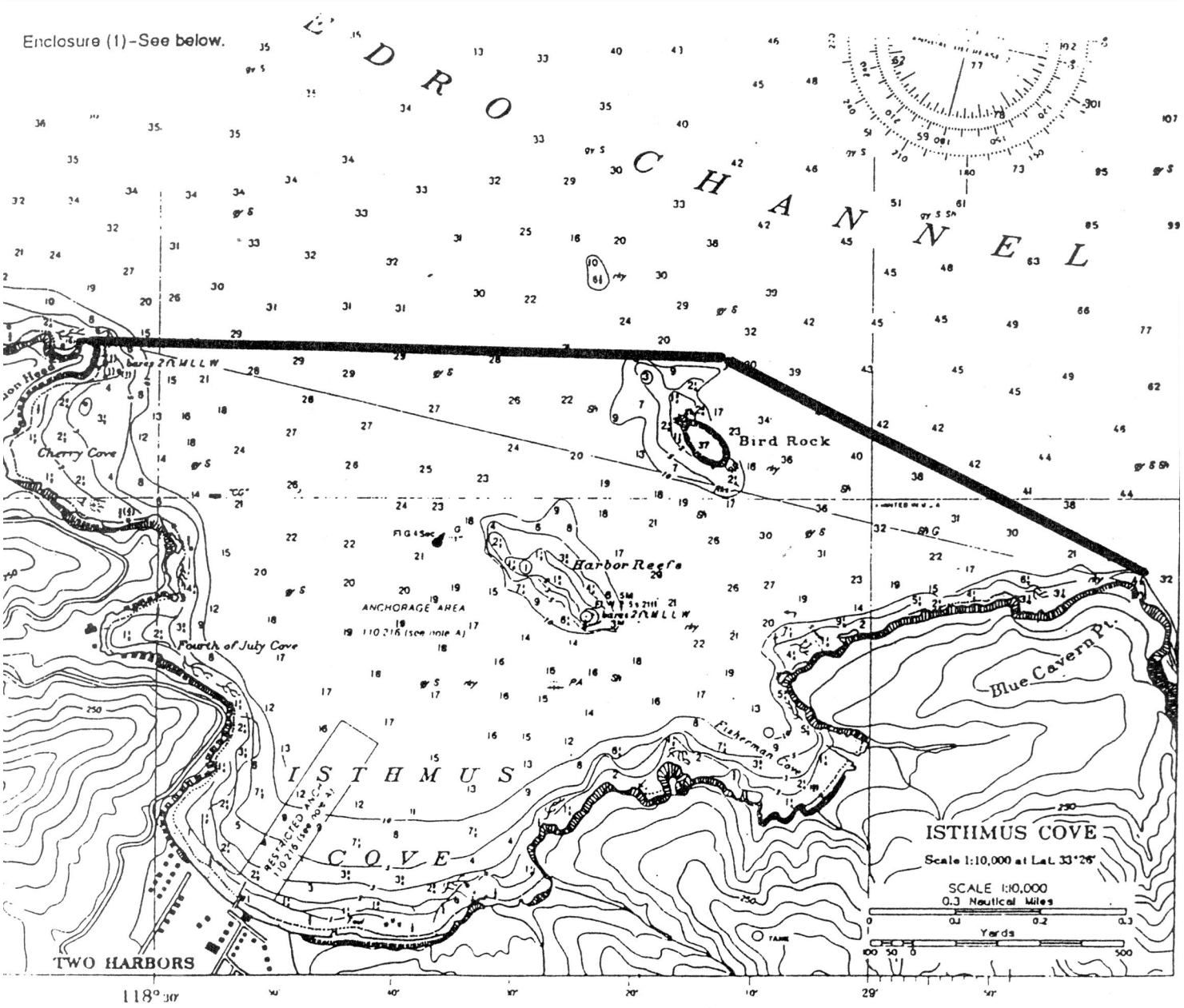
_____ _____
Diving Safety Officer Approval Date

APPENDIX I

WRIGLEY INSTITUTE FOR ENVIRONMENTAL STUDIES
SMALL BOAT BOUNDARIES

Boundaries for general boat use are the following:

Inside Isthmus Cove shoreward of a line that extends from the western tip of Lion Head to the Northwest tip of Bird Rock to the Northwest tip of Blue Cavern Point. Use of any boat outside this area requires specific permission from DSO.



8/30/98

APPENDIX J

USC APPROVED DECOMPRESSION TABLES

The University of Southern California Diving Control Board approves the Michigan Sea Grant (HUGI) tables for compressed gas diving under the University of Southern California auspices. Additional dive tables approved by the DCB may be used for training purposes only.

HUGI

University of Michigan Sea Grant Dive Tables

Developed by: Karl E. Huggins

From Publication #: MICHU-SG-81-205

Danger! Read Warnings and Instructions below before using these Tables

These tables were developed mathematically and have not been subjected to testing to validate them. They are more conservative than the United States Navy No-Decompression tables. If these tables are used in the same manner as the USN tables you will have less allowable dive time (Total Underwater Time).

The maximum recommended ascent rate is 40 fsw/min. when you are between 130 and 20 fsw, and 20 fsw/min. between 20 fsw and the surface. You should make a safety stop at 10-30 fsw for 3-5 minutes at the end of each dive. If you are within the no-decompression time limits of this table when reaching the safety stop, and the 3-5 minutes causes you to exceed the no-decompression limit, your End-of-Dive Letter Group will be "N".

Wait 24 hours after your last dive before ascending over 2,000 feet in altitude.

If these or any other dive tables are used incorrectly, it is possible to develop decompression sickness, which may result in severe injury or death. Although statistically less likely, it is possible to develop decompression sickness even if dive tables are used correctly. The use of these tables to conduct multi-level dives is discouraged. In the event of a diving accident or illness, call the Divers Alert Network (DAN) at their 24-hour emergency line (919) 684-8111.

Production of these tables was made possible by Jeff Bozanic and the National Association of Underwater Instructors (NAUI), 9942 Currie Davis Dr. Suite H, Tampa, FL 33619, (813) 628-NAUI. Tables are distributed by the USC Catalina Hyperbaric Chamber, P.O. Box 5069, Two Harbors, CA 90704-5069; (310) 510-4020. Web Address: http://www.usc.edu/hyperbaric/TOP.HTM. Revised May 15, 1998.

Table 1 – End-of-Dive Letter Group

Total (or Equivalent) Underwater Tine (min.)

Depth in fsw	A	B	C	D	E	F	G	H	I	J	K	L	M	N
20	10	25	40	60	85	110	135	170	215	275	325	569	∞	
30	5	15	25	40	50	65	75	95	110	130	150	175	205	225
35	5	15	20	30	40	50	60	70	85	100	120	135	155	165
40	5	10	20	25	35	40	45	55	60	70	85	100	120	135
50	-	10	15	20	25	30	35	37	40	50	55	60	70	75
60	-	5	10	15	20	23	25	27	30	35	40	45	47	50
70	-	5	10	13	15	17	20	23	25	27	30	33	35	40
80	-	5	7	☜	10	13	15	17	20	☜	25	27	☜	30
90	-	-	5	7	☜	10	☜	13	15	17	☜	20	23	25
100	-	-	-	5	7	☜	☜	10	☜	☜	13	15	17	20
110	-	-	-	-	5	☜	7	☜	☜	10	☜	☜	13	15
120	-	-	-	-	-	5	☜	☜	7	☜	☜	10	☟	☟
130	-	-	-	-	-	5	☟	☟	☟	☟	☟	☟	☟	☟
	☟	☟	☟	☟	☟	☟	☟	☟	☟	☟	☟	☟	☟	☟

Table 2 – Surface Interval Time (hrs:min)

New Group	A	B	C	D	E	F	G	H	I	J	K	L	M	N
N													☞	0:10 0:17
M	☞	☞		☞		☞		☞		☞		☞	0:10 0:23	0:18 0:32
L											☞	0:10 0:23	0:24 0:39	0:33 0:48
K	☞	☞		☞		☞		☞		☞	0:10 0:25	0:24 0:41	0:40 0:57	0:49 1:06
J									☞	0:10 0:28	0:26 0:44	0:42 1:00	0:58 1:16	1:07 1:25
I	☞	☞		☞		☞		☞	0:10 0:29	0:29 0:50	0:45 1:06	1:01 1:21	1:17 1:38	1:26 1:47
H							☞	0:10 0:33	0:30 0:53	0:51 1:14	1:07 1:30	1:22 1:45	1:39 2:02	1:48 2:11
G	☞	☞		☞		☞	0:10 0:33	0:34 1:01	0:54 1:21	1:15 1:42	1:31 1:58	1:46 2:13	2:03 2:30	2:12 2:39
F					☞	0:10 0:42	0:34 1:06	1:02 1:34	1:22 1:54	1:43 2:15	1:59 2:31	2:14 2:46	2:31 3:03	2:40 3:12
E	☞	☞		☞	0:10 0:49	0:43 1:23	1:07 1:47	1:35 2:15	1:55 2:35	2:16 2:56	2:32 3:12	2:47 3:27	3:04 3:44	3:13 3:53
D			☞	0:10 1:03	0:50 1:43	1:24 2:17	1:48 2:41	2:16 3:09	2:36 3:29	2:57 3:50	3:13 4:06	3:28 4:21	3:45 4:38	3:54 4:47
C	☞	☞	0:10 1:19	1:04 2:20	1:44 3:00	2:18 3:34	2:42 3:58	3:10 4:26	3:30 4:46	3:51 5:07	4:07 5:23	4:22 5:38	4:39 5:55	4:48 6:04
B		0:10 2:30	1:20 3:41	2:21 4:42	3:01 5:22	3:35 5:56	3:59 6:20	4:27 6:48	4:47 7:08	5:08 7:29	5:24 7:45	5:39 8:00	5:56 8:17	6:05 8:26
A	0:10 12:00	2:31 12:00	3:42 12:00	4:43 12:00	5:23 12:00	5:57 12:40	6:21 13:10	6:49 13:30	7:09 14:00	7:30 14:20	7:46 14:40	8:01 14:50	8:18 15:10	8:27 15:30

Table 3 – Residual Nitrogen Time (min.)

Maximum Depth of Repetitive Dive (fsw)

20	30	35	40	50	60	70	80	90	100	110	120	130
–	225	166	135	75	53	41	31	26	21	16	13	11
∞	0	0	0	0	0	0	0	0	0	0	0	0
–	207	158	128	71	52	40	30	25	20	15	12	10
∞	18	7	7	4	0	0	0	0	0	0	0	0
569	178	139	109	64	47	37	28	23	18	13	11	9
∞	47	26	26	11	3	3	2	2	2	2	0	0
369	154	122	92	57	43	33	26	21	16	12	10	8
∞	71	43	43	18	7	7	4	4	4	3	0	0
279	132	103	75	51	38	29	23	18	13	11	9	8
∞	93	62	60	24	12	11	7	7	7	4	1	0
219	113	86	66	45	34	26	21	16	12	10	8	7
∞	112	79	70	30	16	14	9	9	8	5	2	0
175	96	73	57	40	30	24	19	14	11	9	8	7
∞	129	92	78	35	20	16	11	11	9	6	2	0
140	80	62	49	36	27	22	17	12	10	8	7	6
∞	145	103	86	39	23	18	13	13	10	7	3	0
111	66	53	43	32	24	19	14	11	9	7	6	6
∞	159	112	92	43	26	21	16	14	11	8	4	0
86	53	44	37	28	22	17	12	9	8	7	6	5
∞	172	121	98	47	28	23	18	16	12	8	4	0
65	41	34	30	23	19	15	10	8	7	6	5	5
∞	184	131	105	52	31	25	20	17	13	9	5	0
45	29	24	21	17	14	12	9	8	6	6	5	5
∞	196	141	114	58	36	28	21	17	14	9	5	0
28	18	16	14	11	9	8	7	6	6	5	5	4
∞	207	149	121	64	41	32	23	19	14	10	5	1
12	8	7	6	5	4	4	3	3	3	3	2	2
∞	217	158	129	70	46	36	27	22	17	12	8	3

000 Black Numbers are Residual Nitrogen Time in minutes. Add to Total Time Underwater on a Repetitive Dive to obtain the Equivalent Underwater Time

000 White Numbers are Adjusted No-Decompression Limits in minutes. Actual Total Time Underwater on a Repetitive Dive should not exceed this time.

APPENDIX K

University of Southern California Month _____ Year _____ Type of Tables/Computer _____

SCUBA DIVING LOG SHEET

Date	Buddy	Location	Actv	S.I.	Gp In	MaxD	TBT	Gp Out	SS	FO2	Conditions/Comments

Have you been hosptialized or have you had any serious illnesses (YES/NO)? If the answer is "Yes" please discuss this with the Dive Safety Officer before resuming diving. Please fill out this log sheet as completely as possible, sign it with your certification number and depth, and return it to the DSO.

**** Important: Please see the reverse side of this form. It contains information on how to use this log, dive log filing requirements, and guidelines for safe diving practices. Please contact the DSO if you have any questions.**

Cert#/Depth Print Name Signature/Date DSO Signature/Date

Guidelines and Key to USC Dive Logs

1. Submit this log to the Dive Safety Officer by the 5th day of the following month. If no dives were made, indicate so on the log. You may mail this log to the DSO at:

1 Big Fisherman Cove
P.O. Box 5069
Avalon, CA, 90704

You may also obtain an electronic version of this form and submit it via e-mail to uscdso@usc.edu.

2. Separate, detailed reports must be filed on the appropriate forms with the Diving Safety Officer for all accidents, incidents, potentially dangerous situations, or equipment failures. (See Appendix L of the Diving Safety Manual).

3. The University of Southern California is not responsible for any recreational diving conducted by USC scientific divers. However, you are required to log these dives.

4. Actv: The purpose of the dive. Indicate **R** for research conducted under the auspices of USC, **T** for all training conducted under the auspices of USC, **M** for all maintenance dives (e.g. cleaning moorings, intake pipe maintenance) conducted under the auspices of USC, and **O** for all other dives (i.e. recreational dives, dives under the auspices of another institution). Please note that maintenance dives require special permission of the DSO.

5. S.I.: Surface interval before dive.

6. Gp In: Repetitive group at the start of the dive according to tables used. (See Appendix J of the Diving Safety Manual for approved decompression models).

7. Max D: Maximum depth reached according to the individual diver's gauge.

8. TBT: Total bottom time.

9. Gp Out: Repetitive group at end of dive.

10. SS: Safety stop. List the depth of the stop and how long spent there. (i.e. 15'/3).

11. FO2: Fraction of oxygen in the breathing mixture.

In the conditions/comments section please indicate whether the dive was cold and/or arduous. (See section 2.2.1 in the Diving Safety Manual on cold/arduous dives). Otherwise use this space to add any information that might be interesting, unusual, or helpful to the DSO.

You may want to photocopy this log for your own records.

APPENDIX L

USC ACCIDENT OR INCIDENT REPORT FORM

DATE & TIME OF ACCIDENT
MONTH/DAY/YEAR ☐☐☐☐ Time _____ AM PM

IS THIS A FATALITY REPORT? ☐ YES ☐ NO

For DAN Office Use Only
CASE
SEVERITY CODE
BMI

1. PATIENT NAME LAST FIRST MI

2. OCCUPATION

3. ADDRESS STREET CITY ST ZIP

4. PATIENT PHONE (HOME) ☐☐☐ - ☐☐☐ - ☐☐☐☐

5. PATIENT PHONE (WORK) ☐☐☐ - ☐☐☐ - ☐☐☐☐

6. COUNTRY (IF NOT USA)

7. AGE YRS ☐☐

8. SEX M or F ☐

9. HEIGHT FT IN ☐☐

10. WEIGHT LBS. ☐☐☐

11. CERTIFYING AGENCY ☐
A - PADI D - YMCA
B - NAUI E - SSI
C - NASDS F - Other
G - None

12. CERTIFICATION LEVEL ☐
A - Basic F - Commercial
B - Open Water G - Other
C - Advanced H - None
D - Divemaster I - Student
E - Instructor

13. DAN MEMBER? ☐
Y - Yes
N - No

14. YEARS DIVING
YEARS ☐☐ MONTHS ☐☐

15. NUMBER OF DIVES MADE
☐☐☐☐☐ Total
☐☐☐ Previous 12 months

16. PREVIOUS DIVE ACCIDENTS ☐
A - Possible DCS
B - DCS
C - AGE
D - Pul. barotrauma
E - None

17. CURRENT MEDICATIONS
Y or N
☐ Prescription
☐ Non-prescription
List _____

18. CIGARETTE USE
☐ A - Presently
B - In past
C - Never
☐ Years Smoking
☐ Packs per day

19. PREVIOUS MAJOR ILLNESSES/ SURGERY
(Provide up to 3 responses)

☐ ☐ ☐
A - Chest-lung
B - Asthma
C - Chest-heart
D - Gastrointestinal/Abdomen
E - Brain
F - Spine/Back
G - Limb or joint of DCS site
H - Circulation/Blood
I - Neurologic/Nervous system
J - Muscle/Skeleton system
K - Eye
L - Mental/Emotional
M - Other _____
N - None

Past:
☐ A - 2-6 months
☐ B - 7-12 months
☐ C - 1-3 years
☐ D - 2-5 years
☐ E - 6+ years

List and describe specific problems:

20. CURRENT HEALTH PROBLEMS WITHIN PREVIOUS 2 MONTH
(Provide up to 3 responses)

☐ ☐ ☐
A - Chest-lung
B - Asthma
C - Chest-heart
D - Gastrointestinal/Abdomen
E - Brain
F - Spine/Back
G - Limb or joint of DCS site
H - Circulation/Blood
I - Neurologic/Nervous system
J - Muscle/Skeleton system
K - Eye
L - Mental/Emotional
M - Other _____
N - None

List and describe specific problems or additional current medications

PLEASE ATTACH SEPARATE SHEET FOR ADDITIONAL INFORMATION OR NARRATIVE.

I understand that the information in this form will be used for research purposes only, and that all personal information will be kept strictly **confidential**. I also understand that the Divers Alert Network may ed to contact me in the future for clarification of information provided on this form.

_____
Patient Signature

8/30/98

DIVE ACCIDENT

21. PURPOSE OF DIVE
- ☐ A - Pleasure
- ☐ B - Work/Labor

22. DIVE ACTIVITY (up to 2 responses)
- ☐ A - Wreck
- ☐ B - Cave
- ☐ C - Night
- ☐ D - Photogra /
- ☐ E - Under Instruction
- ☐ F - Providing Instruction
- ☐ G - Spearfishing/ Game collecting
- ☐ H - Sightseeing

23. ENVIRONMENT
- ☐ A - Freshwater
- ☐ B - Saltwater

24. ALTITUDE OF DIVE
- ☐ A - Sea Level
- ☐ B - > Sea Level but < 1000 ft.
- ☐ C - > 1000 ft.

25. Was this dive or dive series typical of your normal type of diving?
- ☐ Y - Yes
- ☐ N - No

IF NO, Explain _____

26. DIVER'S PERCEPTION OF TEMPERATURE
- ☐ A - Cold
- ☐ B - Hot
- ☐ C - Comfortable

27. CURRENT STRENGT
- ☐ A - Strong
- ☐ B - Moderate
- ☐ C - Mild
- ☐ D - None

28. AIR SUPPLY
- ☐ A - Scuba Air
- ☐ B - Surface Supply Air
- ☐ C - Mixed gas
- ☐ D - None/Breath-hold dive

29. AIR CONSUMPTION
- ☐ A - Ran low
- ☐ B - Out of air
- ☐ C - Not a problem
- ☐ D - Buddy breathing (not octopus)

30. BUOYANCY PROBLEM
- ☐ Y - Yes
- ☐ N - No

31. RAPID ASCENT
- ☐ Y - Yes
- ☐ N - No

32. WITHIN LIMITS-Y or N
- ☐ Tables (which table _____)
- or
- ☐ Computer (type _____)

33. TYPE OF SUIT
- ☐ A - Wet
- ☐ B - Partial Wet
- ☐ C - Dry
- ☐ D - Lycra
- ☐ E - Swim

34. EQUIPMENT USED ON DIVE: (please check all that apply)
- ☐ Depth gauge
- ☐ Timing device/watch
- ☐ Buoyancy vest
- ☐ BC Inflator hose in use
- ☐ Decompression computer

35. EQUIPMENT MALFUNCTION:
- ☐ A - None
- ☐ B - Regulator
- ☐ C - BC Vest
- ☐ D - Weight belt
- ☐ E - Dry suit
- ☐ F - DC Computer
- ☐ G - Inflator hose
- ☐ H - Contaminated air supply
- ☐ I - Equipment was not familiar to you.
- ☐ J - Other

Reason: _____

36. TYPE OF DIVE
- Y - Yes
- N - No
- ☐ Single
- ☐ Repetitive

37. WOMEN, PLEASE RESPOND (up to 2 responses)

When the accident occurred, were you:
- ☐ A - Menstruating
- ☐ B - On birth control medication
- ☐ C - Pregnant
- ☐ D - None of the above

38. DIVE LOCATION:

State, Province, or Island: _____

Country or nearest country: _____

39. How long ago was your last Dive Trip/Series?

☐ Circle one: Days Weeks Months

40. STRENUOU EXCERCISE
- Y - Yes
- N - No
- ☐ 24 hours predive
- ☐ During dive
- ☐ 6 hours postdive

41. PREDIVE HEALTH
- ☐ A - Nausea/ vomiting
- ☐ B - Hangover
- ☐ C - Diarrhea
- ☐ D - Other
- ☐ E - No Problem

42. ALCOHOL

Please check: Number of drinks, beers, or wine
- ☐ None
- ☐ Night Before ☐
- ☐ Predive ☐
- ☐ Between Dives ☐
- ☐ Post Dive ☐

43. RECREATIONAL DRUG USE

Prior to, between, or after dive
- ☐ Y - Yes
- ☐ N - No

44. Do you consider yourself physically fit?
- ☐ Y - Yes
- ☐ N - No
- ☐ Do you excercise on a weekly basis? (Y or N)
- ☐ # Days per week

45. FATIGUE OR LACK OF SLEEP PRIOR TO DIVE?
- ☐ Y - Yes
- ☐ N - No

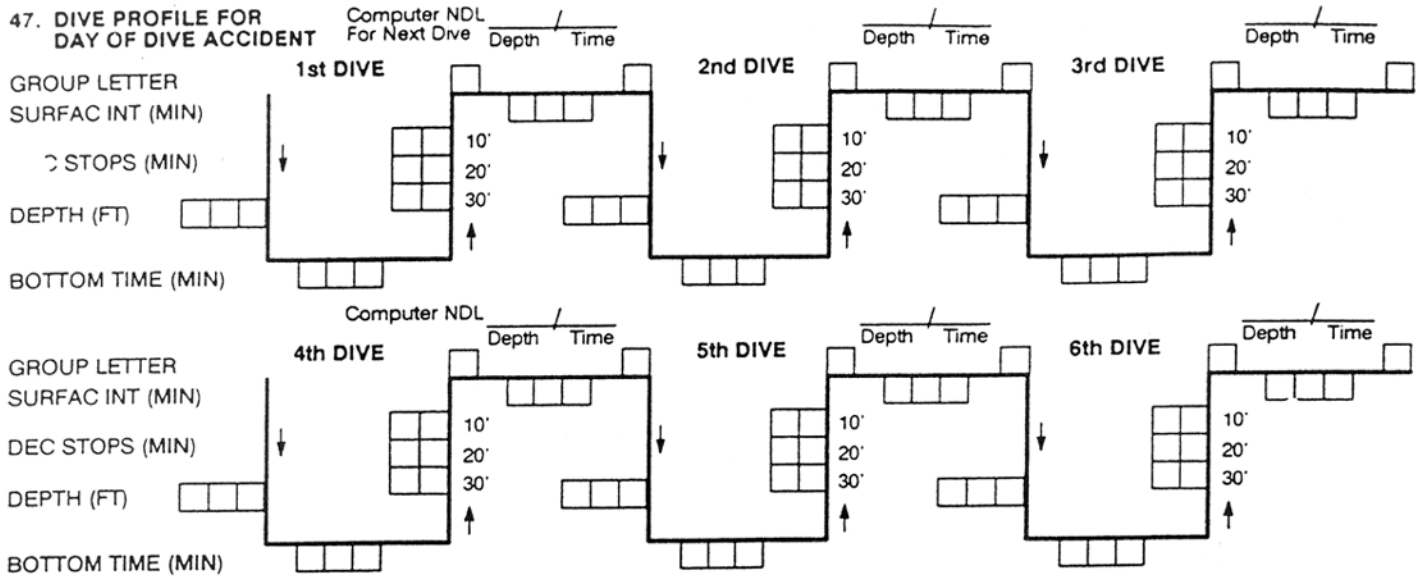
46. DIVE SERIES

Please fill in all that apply up to and including your last dive. If you skipped a day please leave that day blank.

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Total # of dives	☐	☐	☐	☐	☐	☐	☐
Any night dive? (How many)	☐	☐	☐	☐	☐	☐	☐
Any symptoms? (Yor N)	☐	☐	☐	☐	☐	☐	☐
A - All no stop dive(s) B - Any safety stop C - Any dive requiring decompression stops	☐	☐	☐	☐	☐	☐	☐
A - Multilevel (time divided) B - Square	☐	☐	☐	☐	☐	☐	☐
Deepest Dive (ft.)	☐☐☐	☐☐☐	☐☐☐	☐☐☐	☐☐☐	☐☐☐	☐☐☐

DIVE ACCIDENT (cont.)

47. DIVE PROFILE FOR DAY OF DIVE ACCIDENT



PRE-CHAMBER INFORMATION

48. INITIAL CONTACT WAS:

- A - DAN Emergency
- B - DAN Non-emergency
- C - Hospital emergency room
- D - Emergency medical service
- E - US Coast Guard
- F - Physician
- G - Dive instructor/shop
- H - Other: _____

49. Total delay from symptom onset to contacting DAN or other medical help:

HOURS or DAYS

50. FLYING OR INCREASED ELEVATION AFTER DIVING AND PRIOR TO TREATMENT?

- A - Commercial airliner
- B - Unpressurized aircraft
- C - Med Evac Flight
- D - Mountain elevation
- E - Does not apply

Hours post dive (flew or went into elevation)

elevation (in feet)

SIGNS & SYMPTONS

1st Symptom / 2nd Symptom / 3rd Symptom / 4th Symptom / 5th Symptom / 6th Symptom

- A - Pain
- B - Rash
- C - Itching
- D - Weakness
- E - Numbness/Tingling
- F - Dizziness/Vertigo
- G - Semi-consciousness
- H - Unconsciousness
- I - Restlessness
- J - Extreme fatigue
- K - Visual disturbance
- L - Speech disturbance
- M - **Headache**
- N - Paralysis
- O - Difficulty breathing
- P - Nausea/Vomiting
- Q - Hemoptosis/coughing blood from lungs
- R - Muscle twitching
- S - Convulsions
- T - Hearing loss
- U - Ringing ears
- V - Decreased skin sensation
- W - Bladder problem
- X - Bowel problem
- Y - Personality change
- Z - Difficulty walking/ standing
- 1 - Reflex change
- 2 - Other: _____

52. LOCATION: Block A = location of symptom
Then please check (✓)
L = Left R = Right B = Bilateral/Both Sides

	A	L	R	B
1st Symptom				
2nd Symptom				
3rd Symptom				
4th Symptom				
5th Symptom				
6th Symptom				

- A - Head
- B - Face
- C - Sinus
- D - Eyes
- E - Ears
- F - Neck
- G - Shoulder
- H - Entire arm
- I - Upper arm
- J - Elbow
- K - Forearm
- L - Wrist
- M - Hand
- N - Fingers
- O - Chest
- P - Back
- Q - Upper back
- R - Lower back
- S - Abdomen
- T - Buttock
- U - Groin
- V - Hip
- W - Entire leg
- X - Thigh
- Y - Knee
- Z - Calf
- 1 - Shin
- 2 - Ankle
- 3 - Foot
- 4 - Toes
- 5 - Trunk
- 6 - Generalized
- 7 - Other: _____

53. SYMPTOM ONSET:

	HOURS	MINUTES	or	BEFORE SURFACING FROM DIVE
1st Symptom				
2nd Symptom				
3rd Symptom				
4th Symptom				
5th Symptom				
6th Symptom				

54. ANY OF THE SYMPTOMS FROM #51 PRIOR TO THE LAST DIVE?

Y - Yes
N - No

If yes, which symptoms?

1st / 2nd / 3rd / 4th / 5th / 6th

Other

Explain: _____

55. FIRST AID ADMINISTERED BEFORE HOSPITAL OR CHAMBER HELP WAS RECEIVED?

Y - Yes
N - No

- Oxygen
- Aspirin
- Oral fluids
- Head down position/ Trendelenburg

If oxygen was received was delivery by:

- A - Demand valve
- B - Freeflow valve
- C - Don't know

PRE-CHAMBER INFORMATION (cont.)

56. **HOSPITAL TREATMENT ADMINISTERED**

(Please check all that apply):

- ☐ None
- ☐ Oral fluids
- ☐ IV fluids
- ☐ Oxygen
- ☐ Steroids
- ☐ Anticoagulant
- ☐ Aspinn
- ☐ Other medication

_____

_____

57. **RELIEF BEFORE CHAMBER TREATMENT?**

☐
A - Complete
B - Partial
C - Temporary
D - None

59. **PRE-CHAMBER RELIEF OCCURRED:**

☐
A - Without first aid or medical care
B - Following first aid
C - Following pre-chamber hospital care
D - No relief occurred

58. **IF ANY RELIEF OCCURRED, WHICH SYMPTOMS FROM #51 ABOVE?**
(Please check):

- 1st ☐
- 2nd ☐
- 3rd ☐
- 4th ☐
- 5th ☐
- 6th ☐

CHAMBER TREATMENT

60. **CHAMBER TREATMENT FACILITY LOCATION**

CITY

STATE COUNTRY

Date & Time of Treatment

MONTH/DAY/YEAR

Time _____ AM PM

Name of hyperbaric facility:

Treating doctor

Form Completed By

_____

61. **TYPE OF CHAMBER**
(please check)

Initial Treatment	Retreatment Chamber
☐ Monoplace	☐ Monoplace
☐ Dualplace	☐ Dualplace
☐ Multiplace	☐ Multiplace
☐ No chamber treatment given	

62. **TOTAL DELAY FROM SYMPTOM ONSET TO RECOMPRESSION**

HOURS or DAYS

63. **INITIAL TREATMENT**

☐
A - USN TT4
B - USN TT5
C - USN TT6
D - USN TT6A
E - HART Protocol
F - KINDWALL Protocol
G - 45 fsw 90 min
H - 33 fsw 120 min
I - Other

_____

_____

64. **TABLE EXTENSIONS REQUIRED?**

☐
Y - Yes
N - No

65. **RELIEF AFTER INITIAL TREATMENT OF SYMPTOMS FROM # 51?**

- 1st ☐
- 2nd ☐
- 3rd ☐
- 4th ☐
- 5th ☐
- 6th ☐

Please indicate:
A - Complete
B - Partial
C - Temporary
D - None

66. **RETREATMENT GIVEN**
(Provide up to 3 responses)

TABLE	NUMBER OF TREATMENTS
☐	☐
☐	☐
☐	☐

A - USN TT4
B - USN TT5
C - USN TT6
D - USN TT6A
E - HART Protocol
F - KINDWALL Protocol
G - 45 fsw 90 min
H - 33 fsw 120 min
I - Other

_____

67. **RELIEF AFTER HYPERBARIC THERAPY COMPLETED?**

☐
A - Complete
B - Partial
C - Temporary
D - Hyperbaric therapy not completed
E - None

68. **RESIDUAL SYMPTOMS AFTER HYPERBARIC THERAPY COMPLETED?**

☐
A - Pain only
B - Neurologic
C - Hyperbaric therapy not completed
D - None

69. **DURATION OF RESIDUAL SYMPTOMS**

(Circle one)

☐
DAYS
WEEKS
MONTHS

70. **FINAL DIAGNOSIS:**

☐
A - DCS I
B - DCS II
C - Air Embolism
D - Pulmonary Barotrauma
O - Other

_____

_____

_____

I WOULD LIKE TO RECEIVE DAN INFORMATION.

☐
Y - Yes
N - No

APPENDIX M

University of Southern California

Guidelines For Use of Dive Computers

1. Dive computers must be approved by the Diving Safety Officer.

2. Divers wishing to use dive computers while diving under the auspices of University of Southern California must get approval from the DSO, complete an appropriate training session, and complete a written exam.

3. Each diver in a dive team must have their own computer if using the dive computer to determine decompression status.

4. If dive team members are using dive computers with different decompression models, all dive team members must follow the most conservative dive computer.

5. If the dive computer fails at any time during the dive, the dive must be terminated and appropriate surfacing procedures initiated.

6. A diver should not dive for 24 hours prior to using a dive computer to monitor decompression status for subsequent dives.

7. Once the dive computer is in use, it must not be switched off until it indicates that complete off gassing has occurred.

8. When using a dive computer, normal ascents are to be at a rate specified by the make and model of the model being used.

9. Ascent rates should not exceed 30 fsw/min in the last 60 feet to the surface.

10. Whenever practical, divers should make a safety stop between 10 and 30 feet for 3-5 minutes.

11. Repetitive dives should be executed in a sequence of dives to decreasing depths (deepest dive first) to avoid additional decompression stress. Multilevel dives should also be executed with the deepest part of the dive first, followed by gradually decreasing depths.

12. Dive computer users shall demonstrate a clear understanding of the display, operations, and manipulation of the unit being used prior to using the computer, to the satisfaction of the DSO or designee.

APPENDIX N

Definition of Terms

AAUS- The American Academy of Underwater Sciences.

Air Sharing- The sharing of a gas supply between divers.

ASTM- The American Society for Testing and Materials.

Blue Water Diving- Any diving conducted in an area without a functional bottom.

Bottom Time- The total time elapsed from the time the diver leaves the surface in descent to the time that the diver reaches the surface after ascent.

Breath-Hold Diving- A diving mode in which the diver uses no supplementary gas. Also called free diving.

Buddy Breathing- The sharing of gas from a single source between divers.

Buddy System- Two comparably equipped divers in the water in constant communication.

Buoyant Ascent- An ascent made using some form of positive buoyancy.

Burst Pressure- The pressure at which a pressure containment device would fail.

CCR- California Code of Regulations.

Certified Diver- A diver who holds a valid certification card from a nationally recognized agency.

Certified Scientific Diver- A diver who has completed at least the minimum training requirements as set by AAUS and USC (see section 3.2.1) and has been approved by the Diving Safety Officer and the Diving Control Board.

CFR- Code of Federal Regulations.

CGA- Compressed Gas Association.

CNS- Central Nervous System.

Controlled Ascent- Any ascent where the diver maintains the proper ascent rate, and a stop can be made during the ascent.

Cylinder- A vessel for the high pressure storage of gasses.

APPENDIX N

Decompression Diving- Any dive conducted where the decompression model's no-decompression limits have been exceeded. Any dive over 130 fsw.

Decompression Illness (DCI)- A term used to describe hyperbaric injuries related to compressed gas diving.

Decompression Sickness (DCS)- A syndrome caused by bubbles of inert gas forming in the tissues and bloodstream that is associated with compressed gas diving. Also called the bends or caisson's disease.

Decompression Model- A profile or set of profiles of depth time relationship used to determine the length of exposure at a given depth. Also called dive tables.

Dive- A descent into the water breathing compressed gas followed by an ascent and return to the surface.

Dive Computer- A microprocessor that computes a diver's decompression status in real time by referencing depth and time to a built in decompression model.

Dive Location- A surface, shore, or vessel from which a diving operation is conducted.

Dive Site- The general area around the dive location.

Diver- An individual breathing compressed gas underwater.

Diver In Training (DIT)- This permit signifies that a diver has completed a minimum of 40 hours of training with at least 5 ocean or open water dives, and possess a nationally recognized diving certificate or equivalent. (See section 3.1.2 and 3.2.2)

Diving Mode- The equipment, procedures, or techniques specific to the operation. Examples include scuba, surface-supplied, hookah etc.

Diving Control Board (DCB)- The Diving Control Board is an Administrative Committee appointed by the University's vice-president of Business Affairs. The Diving Control Board has the authority granted by California: CCR Title 8 Article 152 §6050-6058. (See section 1.5)

Diving Safety Officer (DSO)- An agent of the Diving Control Board who is responsible for day to day operations of the scientific diving program. (See section 1.6)

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

EMS- Emergency Medical Services.

Enriched Air Nitrox (EANx)- See Nitrox.

APPENDIX N

Equivalent Air Depth (EAD)- The depth at which air will have the same nitrogen partial pressure as the nitrox mixture being used. This number, expressed in feet of seawater, will always be less than the actual physical depth for any nitrox mixture.

FN_2- Fraction of nitrogen in a gas mixture expressed as either a decimal or percentage by volume.

FO_2- Fraction of oxygen in a gas mixture expressed as either a decimal or percentage by volume.

FFW- Feet of fresh water.

FSW- Feet of sea water.

Hookah- A type of shallow water surface supplied diving.

Hyperbaric Chamber- A pressure vessel for human occupancy. A tool used in treatment of decompression illness.

Hyperbaric Conditions- Pressure conditions in excess of normal atmospheric conditions.

Lead Diver- The individual responsible for a specific diving operation. (See section 2.2.2)

Maximum Operating Depth (MOD)- The depth at which the PO_2 for a given gas mixture reaches a predetermined maximum.

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

NOAA- National Oceanographic and Atmospheric Administration.

No Decompression Limits- The depth and time limits of a given decompression model where a diver can make a direct ascent to the surface without required decompression.

Nitrox- The term refers to a breathing mixture of air and oxygen when the percent of oxygen exceeds 21%. This term is synonymous with enriched air, enriched air nitrox, and EANx.

Organizational Member- An organization which is a current member of AAUS.

OSHA- Occupational Safety and Health Administration.

Oxygen Clean- All combustible contaminants have been removed.

APPENDIX N

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

Oxygen Toxicity- Any adverse reaction of the central nervous system (acute oxygen toxicity) or lungs (pulmonary oxygen toxicity) brought on by exposure to an increased (above atmospheric levels) partial pressure of oxygen.

PN_2- Inspired partial pressure of nitrogen usually expressed in units of atmospheres absolute.

PO_2- Inspired partial pressure of oxygen usually expressed in units of atmospheres absolute.

Pressure Related Injury- Any injury resulting from hyperbaric conditions. Examples include decompression sickness, lung over-pressurization injuries, ruptured eardrum, etc.

Psig- Pounds per square inch gauge.

Scientific Diving- Diving that meets the State of California Code of Regulations (CCR) Title 8, Article 152. Scientific diving is exempt from the OSHA Commercial Diving Standard provided that specific requirements are met. (See section 1.1)

Scuba Diving- A diving mode where the diver uses open circuit self contained underwater breathing apparatus.

USC- University of Southern California.

WIES- Wrigley Institute for Environmental Studies.