

DIVING SAFETY MANUAL



STATE OF CALIFORNIA
RESOURCES AGENCY
DEPARTMENT OF FISH AND GAME

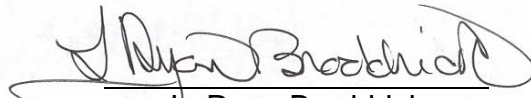
March 2005

California Department of Fish & Game

Diving Safety Manual

March, 2005

As stewards of California's diverse natural resources, the Department of Fish and Game has a responsibility to protect and conserve the State's environments and wildlife. To help fulfill this responsibility in marine and aquatic habitats, the Department has established the Diving Safety Program.




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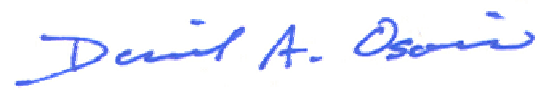
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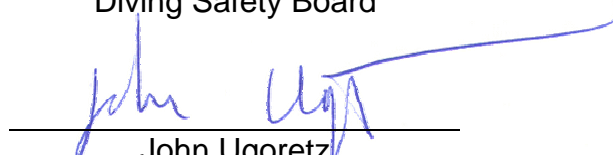
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SECTION 1.00

GENERAL POLICY

1.10 THE SCIENTIFIC DIVING STANDARDS

As stewards of California's diverse natural resources, the Department of Fish and Game has a responsibility to protect and conserve the State's environments and wildlife. To help fulfill this responsibility in marine and aquatic habitats, the Department has established the Diving Safety Program.

The Department of Fish and Game (Department) will administer its Diving Safety Program in a safe, efficient manner to attain its objectives. The Diving Safety Program will also maintain adequate protection for its employees, property, and those for whom the Department has a responsibility.

In 1982, the federal Occupational Health and Safety Administration (OSHA) exempted scientific diving from commercial diving regulations (29CFR1910, Subpart T) under certain conditions that are outlined below. The final guidelines for the exemption became effective in 1985 (Federal Register, Vol. 50, No.6, p.1046). OSHA recognizes the American Academy of Sciences as the scientific diving standard setting organization.

As an Organizational Member of the American Academy of Underwater Sciences (AAUS), the Department adheres to or exceeds their Scientific Diving Standards. The Department also adheres to Title 46, Code of Federal Regulations, Chapter 1, Subchapter V, Part 197, Subpart B - Commercial Diving Operations; and to Title 8, Subchapter 7, Group 26, Article 152, California Code of Regulations - Diving Operations. This manual prescribes the administration of and safety rules for the Department's Diving Safety Program and the policy for implementing the requirements of Title 8, Article 152, California Code of Regulations. The relationship between the Diving Safety Program, use of Department divers, and the Incident Command System (ICS) is also established.

Department projects and programs require diving operations to accomplish their goals and responsibilities. The use of employees as divers is essential to the efficient accomplishment of departmental operations.

1.11 PURPOSE

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

This manual sets minimal standards originally established by the American Academy of Underwater Sciences (AAUS) for recognized scientific diving programs, the organization for the conduct of these programs, and the basic policies and procedures for safety in scientific diving operations. It also establishes a framework for reciprocity between AAUS Organizational Members that adhere to these minimum standards.

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

Specific purposes of this manual include: setting safety standards to ensure that all diving is conducted in a safe manner; setting operational standards to set forth rules, policies, and standards for certification, recertification, supervision, diving procedures, review of records, and necessary equipment; and defining reciprocity to establish a safe working relationship between Department divers and diver from other AAUS Organizational Members.

1.12 SCIENTIFIC DIVING DEFINITION

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

These policies shall apply to all Department employees and volunteers, regardless of diving activity type, and those persons authorized to dive with employees under the auspices of this diving program.

The diver's supervisor shall authorize the necessary time to maintain certification and will budget the monies for diving pay, equipment, travel, and medical examination.

1.13 SCIENTIFIC DIVING EXEMPTION

The Occupational Health and Safety Administration has granted an exemption for scientific diving from commercial diving regulations under the following guidelines (29 CFR Part 1910, Appendix B to Subpart T):

The exempt organization must maintain a Diving Control Board whose membership consists of a majority of active scientific divers and which has autonomous and absolute authority over the scientific diving program's operation. For purposes of this manual and the Department's Diving Safety Program, the use of Diving Safety Board (DSB) shall be deemed to be synonymous with Diving Control Board (DCB).

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

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

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

In addition, the scientific diving program shall contain at least the following elements:

A Diving Safety Manual which includes at a minimum: Procedures covering all diving operations specific to the program; including procedures for emergency care, recompression and evacuation; and the criteria for diver training and certification.

A Diving Safety Board which shall at a minimum have the authority to: approve and monitor diving projects, review and revise the diving safety manual, assure compliance with the manual, certify the depths to which a diver has been trained, take disciplinary action for unsafe practices, and assure adherence to the buddy system (a diver is accompanied by and is in continuous contact with another diver in the water) for scuba diving.

1.14 PUBLIC SAFETY DIVING DEFINED

This is diving whose purpose is to provide search, rescue, or public safety diving services under the direction and control of the Department.

1.15 PUBLIC SAFETY DIVING EXEMPTION

The Occupational Health and Safety Administration (OSHA) has granted an exemption for public safety diving from commercial diving regulations under the guidelines of 29 CFR Part 1910.401(a)(2)(ii).

1.20 OPERATIONAL CONTROL

1.21 DEPARTMENT OF FISH AND GAME AUSPICES DEFINED

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

It is the Department's responsibility to adhere to the AAUS Standards for Scientific Diving Certification and Operation of Scientific Diving Programs. The administration of the diving program will reside with the Department's Diving Safety Board (DSB).

The policies herein shall be observed at all locations where scientific diving is conducted under Department auspices.

1.22 SCIENTIFIC DIVING STANDARDS AND THE DEPARTMENT'S DIVING SAFETY MANUAL

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

- Emergency evacuation and medical treatment procedures
- Criteria for diver training and certification
- Standards written or adopted by reference for each diving mode utilized which include the following:
 - Safety procedures for the diving operation
 - Responsibilities of the dive team members
 - Equipment use and maintenance procedures
 - Emergency procedures

1.23 DIVING SAFETY MANAGER

Overall administration of the Department's diving activities shall be the responsibility of the Diving Safety Manager (DSM), appointed by the Director of the Department of Fish and Game. The DSM will appoint the Diving Safety Board that assists and advises the Diving Safety Officer.

1.24 DIVING SAFETY OFFICER

The Diving Safety Officer (DSO) is appointed by the Diving Safety Manager with the advice and counsel of the Diving Safety Board. The DSO serves as a member of the DSB. This person should have broad technical and scientific expertise in research related diving. In addition, the DSO shall meet the following minimum qualifications:

- Shall be trained as a scientific diver
- Shall be a full member as defined by AAUS
- Shall be an active underwater instructor from an internationally recognized certifying agency

1.24.1 DUTIES AND RESPONSIBILITIES OF THE DIVING SAFETY OFFICER

The Diving Safety Officer (DSO) shall be responsible, through the DSB, to the Diving Safety Manager, for the conduct of the scientific diving program of the Department. The routine operational authority for this program, including the conduct of training and certification, approval of dive plans, maintenance of diving records, and ensuring compliance with this standard and all relevant policies of the Department, rests with the Diving Safety Officer.

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

The Diving Safety Officer shall be guided in the performance of the required duties by the advice of the DSB, but operational responsibility for the conduct of the local diving program will be retained by the DSO.

The Diving Safety Officer shall suspend diving operations considered to be unsafe or unwise.

The Diving Safety Officer shall have full authority to take any action permitted or required by this manual. The DSO shall ensure that all correspondence, diving files, and records are maintained; and will ensure that any required administrative duties are performed. The DSO shall act as a training coordinator for Department diving programs.

1.25 DIVING SAFETY BOARD

The Diving Safety Board (DSB) membership shall consist of a majority of active scientific divers. Voting members shall include the DSO and the DSM or designee. Voting members should also include other representatives of the diving program such as qualified divers and members selected by procedures established by the Department. A chairperson and a secretary may be chosen from the membership of the DSB. The DSB shall consist of at least five active divers, certified to a depth of at least 100 feet with at least one year's regular diving experience with the Department. At least one voting member shall represent the Enforcement Branch.

The DSB's primary responsibility is to ensure a safe and efficient diving operation. The members shall serve as the Department's technical experts and shall assist the DSO in conducting dive training and safety programs.

The DSB must meet at least four times a year; meetings by teleconference may be used to meet this requirement.

New DSB members who are active divers shall become certified at least to the level of Assistant Instructor or Divemaster by an internationally recognized certifying organization. The cost of this certification will be a Department responsibility.

1.25.1 DUTIES OF THE DIVING SAFETY BOARD

The Diving Safety Board Shall:

- Approve and monitor diving projects
- Review and revise the Diving Safety Manual
- Assure compliance with the Diving Safety Manual
- Certify the depths to which a diver has been trained
- Initiate disciplinary action for unsafe practices
- Assure adherence to the buddy system for scuba diving
- Act as the official representative of the Department in matters concerning the scientific diving program
- Act as a board of appeal to consider diver-related problems
- Recommend the issue, reissue, or the revocation of diving certifications
- Recommend changes in policy and amendments to AAUS and the Department's Diving Safety Manual as the need arises
- Establish and/or approve training programs through which the applicants for certification can satisfy the requirements of the Department's Diving Safety Manual
- Suspend diving programs that are considered to be unsafe or unwise
- Establish criteria for equipment selection and use
- Recommend new equipment or techniques
- Establish and/or approve facilities for the inspection and maintenance of diving and associated equipment
- Ensure that the Department's air station(s) meet air quality standards as described in Sections 3.52 and 3.80
- Periodically review the Diving Safety Officer's performance and program
- Sit as a board of investigation to inquire into the nature and cause of diving accidents or violations of the Department's Diving Safety Manual
- Review the use of Department divers in ICS responses, and ensure that Department divers have received appropriate training for the tasks for which they are deployed

1.26 INSTRUCTIONAL PERSONNEL

Qualifications:

All personnel involved in diving instruction under Department auspices shall be qualified for the type of instruction being given.

Selection:

Instructional personnel shall be selected by the DSM, or his/her designee, who will solicit the advice of the DSB in conducting preliminary screening of applicants for instructional positions.

1.27 LEAD DIVER

Nothing in this section relieves the individual diver of their responsibility (Section 1.30).

The lead diver is responsible for the diving operation. Level of experience and training in dealing with the task at hand will supersede rank/classification in selecting a lead diver. The lead diver shall be at the dive location during the diving operation (See Section 2.41). For each dive, one individual shall be designated as the Lead Diver who shall be at the dive location during the diving operation. The Lead Diver shall be responsible for:

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

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

- Planning dives in accordance with Section 2.20

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

- Briefing dive team members on:

 - Dive objectives

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

 - Modifications to diving or emergency procedures necessitated by the specific diving operation

- Suspending diving operations if in their opinion conditions are not safe

- Reporting to the DSO and DSB any physical problems or adverse physiological effects including symptoms of pressure-related injuries that have been reported to them

- Determining that the team members have conducted a functional check of individual diving equipment and that the team member's current state of fitness is adequate before diving activities begin

- Inquiring into the fitness of the dive team members upon completion of a day's diving

- Planning the diving operation to include the safety and health aspects of: diving mode; surface and underwater conditions and hazards (including boat propellers); breathing gas supply; thermal protection; diving equipment; and dive team assignments; residual inert gas status of team members; decompression schedules; altitude corrections; emergency procedures; and any other incidental requirements specified in the dive plan

- On any dive during which Nitrox will be used by any team member, the Lead Diver should be authorized to use Nitrox, and hold appropriate authorizations required for the dive, as specified in AAUS Standards. See Section 7.23.1

1.28 RECIPROCITY AND VISITING SCIENTIFIC DIVER

Two or more AAUS Organizational Members engaged jointly in diving activities, or engaged jointly in the use of diving resources, shall designate one of the participating Diving Safety Boards to govern the joint dive project.

A Scientific Diver from one Organizational Member shall apply for permission to dive under the auspices of another Organizational Member by submitting to the Diving Safety Officer of the host Organizational Member a document containing all the information described in Appendix 5, signed by the Diving Safety Officer or Chairperson of the home Diving Safety Board.

A visiting scientific diver may be asked to demonstrate his/her knowledge and skills for the planned diving.

If the Department denies a visiting scientific diver permission to dive, the Department's Diving Safety Board shall notify the visiting scientific diver and that diver's Diving Safety Board with an explanation of all reasons for the denial.

1.29 WAIVER OF REQUIREMENTS

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

1.30 INDIVIDUAL DIVER RESPONSIBILITY

DIVERS ARE RESPONSIBLE FOR THEIR OWN BEHAVIOR AND SAFETY. It is each diver's responsibility and right to refuse to dive if, in the diver's judgment, conditions are unsafe or unfavorable, the diver's health is impaired, or if diving would violate the dictates of training, these policies, or other applicable regulations (See Section 2.32).

1.40 CONSEQUENCE OF VIOLATION OF POLICIES BY DEPARTMENT DIVERS

Failure to comply with the policies of this diving manual may be cause for the revocation or restriction of the diver's scientific diving certificate by action of the Diving Safety Board. The Diving Safety Officer, or designee, may informally counsel a diver regarding a violation or, with the concurrence of the DSB, issue a Memo of Policy Violation to a diver with a copy to the diver's supervisor. Such actions will be documented pursuant to normal Department procedures (See *Department Operations Manual*, Section 12651). A diver may request an appearance in front of the DSB or submit a written statement to discuss or clarify any incident or to appeal any actions taken by the DSB or the DSO.

1.41 INFORMAL COUNSEL

The preliminary response to minor violations of the standards of this manual that do not pose an immediate threat to the safety of a diver or dive team will be an informal consultation between the DSO and the diver. Minor violations include, but are not limited to, late or incomplete logs, expired medical examination, insufficient dives for certification maintenance, or other violations that are not an immediate threat to diver safety. This consultation will occur after the DSO has obtained the concurrence of the DSB as to the nature of the violation and the content of the consultation. The intent of the informal counsel is to determine the facts of the incident and/or violation and provide the diver with the opportunity to explain and/or correct the situation.

1.42 MEMORANDUM OF POLICY VIOLATION

If the DSO and DSB concur that the nature of a violation needs to be documented to prevent future liability to the Department, the DSO shall issue a Memorandum of Diving Safety Manual Policy Violation to the diver with a copy to the diver's supervisor. This memo will be permanently held in the diving safety program files. This memo will also be considered part of the supervisory record and subject to normal Department procedures for appeal and removal from that record. The DSO and DSB will not submit this memo as part of the employee's personnel file.

1.43 RESTRICTION AND REVOCATION OF CERTIFICATION

Department diving certification may be restricted or revoked for cause by the DSO with the concurrence of the DSB. Violations of Department Diving Safety Manual policy, or other governmental subdivisions not in conflict with the manual, repeated violations, or violations that pose an immediate threat to the safety of a diver or dive team may be considered cause. The DSO shall inform the diver in writing of the reason(s) for restriction or revocation.

1.44 APPEAL OF DIVING SAFETY BOARD OR DIVING SAFETY OFFICER ACTION

A Department diver subject to Informal Counseling may ask to discuss the incident in person with the entire DSB or present a written explanation. A diver in receipt of a Memorandum of Policy Violation, or having a Restriction or Revocation of Diving Certification may ask to appeal the action. The diver shall be given the opportunity to present a case in writing or in person to the DSB for reconsideration and/or recertification. Appeals shall be heard by the DSB within reasonable time to limit disruption of ongoing diving operations.

1.45 RECERTIFICATION AFTER LAPSE OR REVOCATION

A diver whose certification has lapsed or been revoked may be recertified upon completion of the following requirements:

If the diver's certification has been revoked for cause, the cause of revocation must be corrected to the satisfaction of the DSB.

The diver's Regional Manager or Branch Chief must make written application to the DSO.

The diver must have a current physical examination on file with the DSO.

The diver must show evidence of current emergency care training as required (Section 5.31).

The diver must complete the standard annual diver recertification course and other skill evaluations as required by the DSB. This includes the possibility of required attendance at a full certification course.

1.50 GENERAL DEFINITIONS

The following definitions apply to the types of diving covered in this manual. For specific definitions of terms used in the manual see Appendix 4.

Dive. For the purposes of record keeping and certification maintenance a "dive" will consist of the following: an entry, an underwater activity using compressed gas, an exit, and a minimum ten minute surface interval.

Diver. A "diver" is a scuba certified employee conducting a dive. A Department employee may not dive on Department time or use Department diving equipment unless certified by the DSO as a diver.

Law Enforcement/Public Safety Dive. Law enforcement or public safety dives are those made in the course of enforcing regulations or laws or assisting in emergency response by, or under the direction of, a peace officer or emergency personnel.

Lead Diver. The lead diver is responsible for coordinating diving activities for the diving operation. The lead diver is generally the most experienced diver on site and maintains the overall safety of the diving operation.

Light Maintenance Dive. Light Maintenance Dives are those made to perform routine or emergency maintenance on, repair, or installation of equipment to a vessel or structure, recover or salvage items other than those used in a scientific or public safety investigation (evidence recovery), or to conduct routine monitoring activities at a hazardous material investigation that is not part of a scientific or public safety investigation. These dives have special requirements (Section 6.70). The DSO must approve dives requiring heavy equipment.

Scientific Dive. A scientific dive is a dive to collect scientific data by, or under the direction of a scientist.

Training Dive. Training dives are those in which divers participate in order to fulfill certification or instructional requirements. They are also conducted to maintain

proficiency. Training dives conducted outside Department auspices on Department time must be approved by the DSO.

1.60 RECORD MAINTENANCE

The Diving Safety Officer or his/her designee shall maintain permanent records for each certified diver. The file shall include evidence of certification level, log sheets, results of current physical examination, waiver, reports of disciplinary actions by the Diving Safety Board, and other pertinent information deemed necessary.

Availability of Records:

Medical records shall be available to the attending physician of a diver or former diver when released in writing by the diver.

Records and documents required by this standard shall be retained for the following period:

Physician's written reports of medical examinations - 5 years.

Diving Safety Manual - current document only

Records of dive - 1 year, except 5 years where there has been an incident of pressure-related injury

Pressure related injury assessment - 5 years

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

Termination or Revocation of Active Diver Status - 5 years

Memorandum of Policy Violation – Permanent in Active Diver's file may be removed from supervisory file per Department procedures

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SECTION 2.00**PROCEDURES****2.10 INTRODUCTION**

No person shall engage in any scuba diving operations under Department auspices unless he/she holds a current certification issued pursuant to the provisions of this manual.

2.20 PRE-DIVE PROCEDURES**2.21 DIVE PLANS**

Dives should be planned around the competency of the least experienced diver. Before conducting any diving operations under the auspices of the Department, the diving supervisor or lead diver for a proposed operation must formulate a dive plan that should include the following:

Divers' qualifications and the type of certificate or certification held by each diver

Emergency Plan with the following information:

- Name, telephone number, and relationship of person to be contacted for each diver in the event of an emergency
- Nearest operational recompression chamber
- Nearest accessible hospital
- Available means of transport
- Approximate number of proposed dives
- Location(s) of proposed dives
- Estimated depth(s) and bottom time(s) anticipated
- Decompression status and repetitive dive plans, if required
- Proposed work, equipment, and boats to be employed
- Any hazardous conditions anticipated

2.22 PRE-DIVE SAFETY CHECKS

Diver's Responsibility:

Each scientific diver shall conduct a functional check of his/her diving equipment in the presence of the diving buddy or tender.

It is the diver's responsibility and duty to refuse to dive if, in his/her judgment, conditions are unfavorable or if he/she would be violating the precepts of his/her training, or this manual (Section 1.30).

No dive team member shall be required to be exposed to hyperbaric conditions against his/her will, except when necessary to prevent or treat a pressure-related injury.

No dive team member shall be permitted to dive in conditions likely to adversely affect the safety and health of the diver or other dive members.

Equipment Evaluations:

Each diver shall ensure that his/her equipment is in proper working order and that the equipment is suitable for the type of diving operation.

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

Site Evaluation:

The environmental conditions at the site will be evaluated.

2.30 GENERAL DIVING PROCEDURES

2.31 SOLO DIVING PROHIBITION

All diving activities shall assure adherence to the buddy system for scuba diving (Two comparably equipped divers in the water in constant communication). This buddy system is based on mutual assistance, especially in the case of an emergency. In the case of a tethered diver with direct communication to the surface, the buddy may be a fully suited diver, prepared to assist.

2.32 REFUSAL TO DIVE

The decision to dive is that of each individual diver. A diver may refuse to dive, without fear of penalty, whenever the diver believes it is unsafe for them to make the dive (Section 1.30).

The ultimate responsibility for safety rests with the individual diver. It is the diver's responsibility and duty to refuse to dive if, in their judgment, conditions are unsafe or unfavorable or if they would be violating the precepts of their training or the policies of this manual (Section 1.30).

2.33 DIVING UNDER THE INFLUENCE OF DRUGS OR INTOXICANTS

Alcoholic beverages will not be consumed eight hours before any dive.

Divers will not use restricted or prescription drugs while diving without the specific consent of a physician.

2.34 BLOOD DONATION

Divers should consult with a knowledgeable physician regarding time frames of donating blood prior to and after diving.

2.35 TERMINATION OF THE DIVE

It is the responsibility of the diver to terminate the dive, without fear of penalty, whenever they feel it is unsafe to continue the dive, unless it compromises the safety of another diver already in the water (Section 1.30)

The dive will be terminated while there is still sufficient breathing gas to permit the diver to safely reach the surface, including any required decompression time, or to safely reach an additional air source at the decompression station.

2.36 EMERGENCIES AND DEVIATIONS FROM POLICIES

Any diver may deviate from the requirements of this manual to the extent necessary to prevent or minimize a situation that is likely to cause death, serious physical harm, or major environmental damage. A written report of such actions must be submitted to the Diving Safety Board explaining the circumstances and justifications.

2.40 DIVING PROCEDURES

2.41 LEAD DIVER

An appropriately qualified diver will be designated by the dive team as the lead diver for each dive or series of dives. The lead diver is responsible for the diving operation. Level of experience and training in dealing with the task at hand will supersede rank/classification in selecting a lead diver. The lead diver shall be at the dive location during the diving operation. Refer to Section 1.27 for the duties of the lead diver. Nothing in this section alters each individual diver's responsibility (Section 1.30).

2.42 DIVE TEAMS

Close continuous contact must be maintained during each dive. Upon loss of contact, divers should check the surrounding area to re-establish contact. If contact is not made in a reasonable period, the divers shall surface and establish contact. The dive will be terminated when any team member runs low on breathing gas or approaches any other safe diving limitation.

Each buddy team will have an emergency evacuation and emergency medical plan and diving tables, or other planning method appropriate to the dive mode, available for immediate reference before and after each dive.

2.43 INCIDENT COMMAND SYSTEM (ICS)

The Department has selected the ICS for managing all responses, including multi-agency and multi-jurisdictional emergencies. Department employees shall use the ICS when responding to pollution, wildfire, public safety, or other incidents.

The diving program shall participate in the ICS as the Dive Operations Branch of the Operations Section. Either the DSO, a member of the DSB, or a dive team leader having training or experience in dealing with the technical factors specific to the incident shall serve as the Branch Director, and shall report to the Operations Section Chief. The Dive Operations Branch Director shall be delegated full authority over the deployment of Department divers. Nothing herein shall override the "Individual Diver Responsibility" (Section 1.30).

2.50 POST-DIVE PROCEDURES

2.51 POST-DIVE SAFETY CHECKS

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

When diving outside the no-decompression limits, the divers should remain awake for at least 1 hour after diving, and in the company of a dive team member who is prepared to transport them to a decompression chamber if necessary.

2.52 TRAVELING AFTER DIVING

Divers should have a minimum surface interval of 12 hours before ascending to altitude (greater than 1000 feet elevation). This includes ascent to altitude while flying or driving over mountain passes. A 24 hour surface interval is recommended after a staged decompression dive or after repetitive dives.

2.60 EMERGENCY PROCEDURES

The Department will develop emergency procedures which follow the standards of care of the community and must include procedures for emergency care, recompression and evacuation for each dive location.

Each diving project, supervisor, or lead diver will develop emergency procedures appropriate to their activities. It is essential that emergency procedures be pre-planned and understood by all divers and surface support personnel to ensure that appropriate medical treatment is initiated as soon as possible. Procedures include extrication, treatment, evacuation, and Emergency Medical Services (EMS) response based on local resources. To facilitate these components, divers should use the Diving Emergency Management Procedures Form (Appendix 8).

2.70 CONTAMINATED ENVIRONMENTS

Any diver requested to dive in a known contaminated environment shall notify the DSO before proceeding. Dives conducted in petroleum contaminated water shall follow the procedures set forth in the Specialized Diving Modes section of this manual (Section 7).

In the event a diver is exposed to environmental contamination in the course of a normal working dive, the diver shall immediately notify the DSO or DSB and consult a physician.

2.80 RECORD KEEPING AND REQUIREMENTS

2.81 PERSONAL DIVING LOG

Each certified diver shall log every dive made under the auspices of the Department of Fish and Game's Diving Safety Program and is encouraged to log all other dives. The personal diving log shall be retained by the diver and will include at least the following:

- Name of diver, buddy, and Lead Diver
- Date, time, and location
- Diving modes used
- Diving gas used
- General nature of diving activities
- Approximate surface and underwater conditions
- Maximum depths, bottom time, and surface interval time
- Diving tables or computers used
- Detailed report of any near or actual incidents

Personal Logs should be retained by each diver for at least one year.

2.82 MONTHLY DIVING LOG

Each diver shall submit a Monthly Diving Log on a form established by the DSB (Appendix 10). Monthly Diving Logs must report all Department dives, as well as those non-Department dives used to maintain the required diving hours. If no dives are made, a Monthly Diving Log showing "no dives" will be submitted. Logs will contain all the information listed in Section 2.81 as well as pay hours if applicable.

Divers shall forward a copy of their Monthly Dive Log to the DSO at the end of each month. Logs not received by the tenth day of the following month will be considered delinquent. Divers not submitting logs in a timely manner are subject to de-certification.

The Department will maintain logs for a minimum of one calendar year, except five years where there has been an incident of pressure-related injury (Section 3.61).

2.83 DIVE PAY

Divers shall receive diving pay, subject to Department of Personnel Administration (DPA) rules. Only those classifications that are eligible for diving pay as shown on the Department pay scales will receive diving pay. Divers shall be paid only for dives occurring under Department auspices.

A copy of the Monthly Diving Log must be attached to the Monthly Attendance Report (Form FG 681). Dive Pay Time from the Monthly Diving Log must be entered in the "dive pay" box of Form FG 681. Attendance reports including dive pay shall be retained in accordance with personnel document retention schedule.

2.84 REQUIRED INCIDENT REPORTING

All diving incidents requiring recompression treatment, or resulting in moderate or serious injury, or death shall be reported to the Department's Diving Safety Board and the AAUS using the form specified (Appendix 6) within 48 hours, unless prevented by the circumstances of the incident. The Department's regular procedures for incident reporting, including those required by the AAUS, shall be followed. The report will specify the circumstances of the incident and the extent of any injuries or illnesses. The Diving Safety Board shall investigate and document any incident of pressure-related injury and prepare a report which will be forwarded to the AAUS during the annual reporting cycle.

If pressure-related injuries are suspected, or if symptoms are evident, the following additional information shall be reported to and recorded by the Department and AAUS. (Complete AAUS Incident Report at <http://www.aaus.org>):

The written descriptive report shall include:

- Name, address, phone numbers of the principal parties involved
- Summary of experience of divers involved
- Location, description of dive site, and description of conditions that led up to incident
- Description of symptoms, including depth and time of onset
- Description and results of treatment
- Disposition of case
- Recommendations to avoid repetition of incident

Documents shall be retained by the Department, with the record of the dive, for a period of 5 years

In addition, the following shall be reported as applicable:

Minor injuries or potentially hazardous incidents should be reported to the DSO on the Department Report of Minor Injury form (Appendix 7).

The Department shall record and report occupational injuries and illnesses in accordance with requirements of the appropriate Labor Code section.

Submitting the above mentioned forms is in addition to any other Department requirements for reporting injury or accident.

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SECTION 3.00**DIVING EQUIPMENT****3.10 GENERAL POLICY**

All equipment shall meet standards as determined by the Diving Safety Officer and the Diving Safety Board. Equipment shall be used in accordance with safe diving practices and within the manufacturers' specifications. Equipment subjected to extreme use or adverse conditions requires more frequent testing and maintenance.

The Department shall provide the following equipment to each certified diver.

Exceptions to the required Department diver equipment may be granted upon request to and approval of the Diving Safety Officer.

The Diver shall regularly examine all equipment.

3.20 REQUIRED PERSONAL EQUIPMENT**3.21 SCUBA REGULATOR(S)**

Regulators disapproved by the Diving Safety Officer and the Diving Safety Board shall not be used.

Each diver shall have and maintain at least one scuba regulator. Regulators will consist of a balanced first stage and a demand valve second stage. In addition, each diver shall have available an alternate breathing gas source. This may include an "octopus" second stage; a buoyancy compensator integrated second stage, or a redundant gas delivery system.

Scuba regulators shall be inspected and "bench-tested" prior to first use and every six months thereafter (Section 3.71).

Scuba regulators should be checked for leaks and free flow prior to each dive.

3.22 SCUBA CYLINDERS

Each diver shall maintain a minimum of two single cylinders.

The use of "J" (Reserve / Rescue) Valves on scuba cylinders is prohibited.

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

3.23 BACKPACK, WEIGHTING SYSTEM, AND FLOTATION DEVICE

Each diver shall have a backpack, weighting system, and a flotation device capable of achieving and maintaining positive buoyancy. These items may be integrated.

Backpacks without integrated flotation will have a quick release device designed to permit jettisoning with a single motion from either hand.

Weight belts and integrated weight systems used by divers will be capable of quick one-handed release.

Personal flotation systems, buoyancy compensators, dry suits, or other variable volume buoyancy compensation devices will be equipped with an exhaust valve.

These devices shall be functionally inspected and tested at intervals not to exceed six months (Section 3.74). Buoyancy compensator checks should include: manual oral inflation, power inflation, deflation with all manual valves and over-inflation release.

3.24 SOUND MAKING DEVICE

Each diver shall have a device capable of audibly signaling for assistance or attention at the surface.

3.25 FACEMASK

Facemasks will have tempered glass or shatterproof lenses.

Corrective lenses are approved.

Full face masks will be of a design that does not allow the build-up of excessive carbon dioxide.

3.26 TIMING DEVICE, DEPTH AND PRESSURE GAUGES

Each diver shall have an underwater timing device capable of showing dive time and time of day, an approved depth indicator, and a submersible cylinder pressure gauge.

Capillary depth gauges are not approved.

Gauges shall be inspected and tested before first use and every six months thereafter (Sections 3.75).

3.27 FINS

Each diver shall have at least one pair of fins appropriate for the dive conditions.

3.28 CUTTING TOOL

Each diver shall have a cutting tool, knife, wire cutters, or EMT scissors (cutting shears) as appropriate. An alternate cutting tool secured in a different location on the diver is recommended.

3.29 SNORKEL

Each diver shall have one snorkel appropriate for breathing at the surface.

3.30 COMPASS

Each diver shall have one underwater compass.

3.31 DIVE LIGHT

Each diver shall have a functional underwater light for use on night or low visibility dives. A second, back-up, light is recommended.

3.32 THERMAL PROTECTIVE SUIT

Each diver shall have a thermal protective suit (i.e. wetsuit or dry suit) appropriate for the dive location and conditions.

Use of dry suits requires proof of formal training approved by the Diving Safety Officer (Section 7).

3.33 METHOD OF DETERMINATION OF DECOMPRESSION STATUS: DIVE TABLES, DIVE COMPUTERS

A set of dive tables, approved by the Diving Safety Board, must be available at the dive location.

Dive computers may be used in place of dive tables if the following guidelines are adhered to:

Makes and models of dive computers specifically disapproved by the Diving Safety Officer may not be used.

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

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

If the dive computer fails during the dive, the dive must be terminated and appropriate surfacing procedures should be initiated immediately.

A diver should not dive during the 24 hours preceding the activation of his/her dive computer if it is to be used for controlling subsequent dives.

Once a dive computer is in use, it must not be switched off until it indicates that complete out gassing has occurred or 18 hours have elapsed, whichever occurs first.

When using a dive computer, non-emergency ascents are to be at the rate specified for the make and model of the dive computer being used.

Ascent rates will not exceed 30 fsw/min in the last 60 fsw or the computer's recommended rate, whichever is slower.

Whenever practical, divers using a dive computer should make a stop between 10 and 20 feet for 3 - 5 minutes, especially for dives below 60 fsw. In addition, divers completing dives over 100 feet should consider making a one minute safety stop on ascent at a depth equal to one half of the deepest depth of the dive.

Although decompression dives should be planned using U.S. Navy tables, divers should follow decompression procedures indicated on their computers if more conservative than the tables.

Repetitive deep dives should be conducted within the guidelines of dive tables or the most conservative computer used. The No Decompression Limits (NDL) shall not be exceeded unless the dives include planned decompression stops and conform to the decompression standards of this manual.

The inclusion of a "deep stop", a safety stop, and long surface intervals are recommended for NDL dives.

Computers will not be used for diving in fresh water or at altitude, unless the dive computer specifically allows for such dives.

A time measuring device (diving watch) and suitable depth gauge must be worn in addition to a dive computer. A log of maximum depth, dive time, and surface intervals will be maintained as a backup.

AAUS recommendations on dive computers are available at <http://www.aaus.org>.

3.40 REQUIRED DIVE TEAM EQUIPMENT

3.41 DIVING FLAGS

When diving in areas capable of supporting marine vessel traffic a rigid replica of the International code flag "A" or appropriate night signal shall be displayed as required by USCG Navigation Rule 27(e) for a vessel restricted in its ability to maneuver.

The additional use of a rigid recreational diving red and diagonal white stripe, "Diver Down" flag is recommended.

When diving from shore, or in shallow water in areas of vessel traffic, the “diver down flag” is a minimum requirement and will be prominently displayed.

3.42 EMERGENCY OXYGEN DELIVERY SYSTEM

Emergency oxygen supply (such as a DAN O₂ Kit) will be available.

3.43 FIRST AID SUPPLIES

A first aid kit will be available.

3.50 AUXILIARY EQUIPMENT

3.51 HANDHELD UNDERWATER POWER TOOLS

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

3.52 COMPRESSOR SYSTEMS – DEPARTMENT CONTROLLED

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

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

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

3.53 OXYGEN SYSTEMS

Equipment used with oxygen or mixtures containing over forty percent (40%) by volume oxygen will be designed and maintained for oxygen service.

Components exposed to oxygen or mixtures containing over forty percent (40%) by volume oxygen will be cleaned of flammable materials before being placed into service.

Oxygen systems over 125 psig will have slow-opening shut-off valves.

3.54 BREATHING MASKS AND HELMETS

Breathing masks and helmets shall have:

- A non-return valve at the attachment point between helmet or mask and hose, which shall close readily and positively
- An exhaust valve

A minimum ventilation rate capable of maintaining the diver at the depth to which he/she is diving

Full Face Masks will be of a modern design that does not allow for the buildup of excessive carbon dioxide.

3.60 EQUIPMENT MAINTENANCE

All equipment is to be maintained in a safe operating condition. Divers shall inspect all tools, equipment, and operational systems used in diving operations to ensure they are appropriate and in proper working order before diving.

3.61 RECORD KEEPING

Each equipment modification, repair, test, calibration, or maintenance service shall be logged, including the date and nature of work performed, serial number of the item, and the name of the person performing the work for the following equipment:

- Regulators (including alternate gas sources)
- Submersible cylinder pressure gauges
- Depth gauges
- Scuba cylinders
- Cylinder valves
- Diving helmets
- Submersible breathing masks
- Compressors
- Gas control panels
- Air storage cylinders
- Air filtration systems
- Analytical instruments
- Buoyancy control devices
- Dry suits
- Emergency oxygen delivery systems

3.62 COMPRESSOR OPERATION AND AIR TEST RECORDS

Gas analyses and air tests shall be performed on each Department-controlled breathing air compressor at regular intervals of no more than 100 hours of operation or six months, whichever occurs first. The results of these tests shall be entered in a formal log and be maintained.

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

3.70 SCHEDULES OF MAINTENANCE

Equipment	Required Testing/Maintenance Schedule*
Scuba regulators	Test each 6 months
Scuba cylinders	Visual inspection each 12 months Hydrostatic test each 5 years
Pressure gauges	Test each 6 months
Buoyancy compensators	Test each 6 months
Depth gauges	Test each 6 months
Dive computers	Test each 6 months
Breathing gas analyzers	Calibrated each dive Calibrated to known source 6 months
Emergency Oxygen Delivery Systems	Per manufacturers specifications Cylinders hydrostatically tested each 5 years

*maximum timeframe should not exceed manufacturer's specifications

3.71 SCUBA REGULATORS

Scuba regulators will be “bench-tested” every 6 months and perform in accordance with manufacturers standards. Regulators should be overhauled by a qualified technician on a schedule as determined by the manufacturer.

3.72 SCUBA CYLINDERS

Scuba cylinders will have an internal visual inspection at intervals not to exceed 12 months.

Scuba cylinders and valves will be functionally tested at intervals not to exceed 12 months.

Scuba cylinders will be hydrostatically tested every 5 years in accordance with Department of Transportation (DOT) standards.

Cylinder valve burst discs will be replaced as necessary. At a minimum, discs should be replaced at the time of cylinder hydrostatic testing.

Scuba cylinders dedicated to the use of Nitrox or oxygen shall be marked with proper cylinder bands and contents tags.

3.73 SUBMERSIBLE (CYLINDER) PRESSURE GAUGE

Submersible (cylinder) pressure gauges will be tested against a master gauge at intervals not to exceed 6 months.

3.74 BUOYANCY COMPENSATORS

Buoyancy compensation devices must be functionally inspected at intervals not to exceed 6 months.

3.75 DEPTH GAUGES

Each depth gauge will be tested or calibrated every 6 months or when there is reasonable cause to believe a discrepancy exists.

3.76 DIVE COMPUTERS

Each computer will be tested or calibrated every 6 months or when there is reasonable cause to believe a discrepancy exists. Maintenance will be performed in accordance with the manufacturer's specifications.

3.77 BREATHING GAS ANALYZERS

Breathing gas analyzers will be calibrated with air before each use. They will be calibrated with a known gas mixture every 6 months or as per manufacturer's recommendation. Sensor replacement and servicing should follow manufacturer's schedule and recommendations.

3.78 EMERGENCY OXYGEN DELIVERY SYSTEMS

Regulators: Assemblies will be serviced as recommended by the manufacturer. Regulators subject to recall or believed to be contaminated will immediately be removed from service.

Cylinders: Will be purged and refilled every two years, and will be hydrostatically tested every five years (DOT requirement).

3.80 AIR QUALITY STANDARDS

Breathing air for scuba shall meet the following specifications as set forth by the Compressed Gas Association (CGA Pamphlet G-7.1).

CGA Grade E	
Component	Maximum
Oxygen	20 - 22%/v
Carbon Monoxide	10 PPM/v
Carbon Dioxide	1000 PPM/v
Condensed Hydrocarbons	5 mg/m ³
Water Vapor	NS
Objectionable Odors	None

SECTION 4.00 ENTRY-LEVEL TRAINING PREREQUISITES

This section reviews prerequisites for the Department Scientific Diving Certification program. Applicants must possess a valid entry-level /Open Water scuba certification issued by a recognized Recreational Scuba Training Council (RSTC) organization (See Appendix 11) as well as the following Emergency Care Training: Cardio-Pulmonary Resuscitation (CPR); Emergency Oxygen Administration; First Aid for diving accidents; Open Water Diving Rescue (See Section 5.30).

Note: The Department of Fish and Game does not offer entry-level training for scuba diving at this time

4.10 BASIC REQUIREMENTS

Medical Evaluation:

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

Swimming Skills Evaluation:

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

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

4.20 SCUBA TRAINING SKILLS CHECK

Before advancing to subsequent portions of the Scientific Diving Certification course, the trainee must satisfy the Diving Safety Officer or the instructor of their ability to perform the following, as a minimum, in a pool or in sheltered water:

- Enter water with full equipment
- Clear face mask
- 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
- Demonstrate ability to alternate between snorkel and scuba while kicking
- Demonstrate understanding of underwater signs and signals
- Demonstrate simulated in-water mouth-to-mouth resuscitation

Rescue and transport, as a diver, a passive simulated victim of an accident
Demonstrate ability to remove and replace equipment while submerged
Demonstrate comfort and confidence in the water, which is acceptable to the instructor

4.30 WRITTEN EXAMINATION

Before admittance to the certification course the trainee must complete, and subsequently pass a comprehensive written examination that demonstrates knowledge of at least the following:

Function, care, use, and maintenance of diving equipment
Physics and physiology of diving
Diving policies and precautions
Near-shore currents and waves
Dangerous marine animals
Emergency procedures, including buoyant ascent and ascent while air sharing
Currently accepted decompression procedures
Proper use of dive tables
Underwater communications
Aspects of freshwater and altitude diving
Hazards of breath-hold diving and ascents
Planning and supervision of diving operations
Diving hazards
Causes, symptoms, treatment, and prevention of the following:
near drowning, air embolism, carbon dioxide excess, squeezes, oxygen poisoning, nitrogen narcosis, exhaustion and panic, respiratory fatigue, motion sickness, decompression sickness, hypothermia, and hypoxia/anoxia

4.40 OPEN WATER EVALUATION

Before advancing to subsequent portions of the Scientific Diving Certification course, the trainee must satisfy an instructor, approved by the Diving Safety Officer, of their ability to perform at least the following in open water:

Surface dive to a depth of 10 feet in open water without scuba
Demonstrate proficiency in air sharing as both donor and receiver
Enter and leave open water or surf, or leave and board a diving vessel, while wearing scuba gear
Kick on the surface 400 yards while wearing scuba gear, but not breathing from the scuba unit
Demonstrate judgment adequate for safe diving
Demonstrate, where appropriate, the ability to maneuver efficiently in the environment, at and below the surface
Complete a simulated emergency swimming ascent
Demonstrate clearing of mask and regulator while submerged
Demonstrate ability to achieve and maintain neutral buoyancy while submerged
Demonstrate techniques of self-rescue and buddy rescue

Navigate underwater

Plan and execute a dive as dive team leader

Successfully complete 5 open water dives for a minimum total time of 3 hours, of which 1.5 hours cumulative bottom time must be on scuba. No more than 3 training dives shall be made in any 1 day.

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SECTION 5.00**DIVER CERTIFICATION****5.10 CERTIFICATION**

Certification in the Department's diving program is limited to paid and volunteer employees of the Department. Employees of other state agencies may be admitted to the certification course at the discretion of the DSM with concurrence of the DSB. A statement of training, but no Department certification will be issued to them. The DSO will notify their agency of their successful/unsuccessful completion of the course.

5.11 GENERAL POLICY

No person shall engage in scientific diving unless that person is authorized by the Department pursuant to the provisions of this manual. Only a person diving under the auspices of the Department while subscribing to the practices of AAUS is eligible for a scientific diver certification. The purpose of the certification standards is to ensure that all diving for the Department is conducted in a safe manner;

5.20 CERTIFICATION TYPES**5.21 DEPARTMENT SCIENTIFIC DIVER CERTIFICATION**

This is the required certification for employees and volunteers to dive under Department auspices in support of a Department scientific, research, or educational activity (See appendix 12 for volunteer diver certification procedures). This is a revocable permit to dive only while current, in good standing, and for the purposes intended.

5.22 RESTRICTED CERTIFICATION (TEMPORARY DIVER PERMIT)

A supervisor may request, and an employee may receive, a Restricted Diver Certification if such a certification is in the interest of the Department. Such a restricted certification will be made available to trained divers with demonstrated training and experience in a program equivalent to the Department's diving program. A restricted diver may dive on departmental dives, subject to the following conditions:

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 possesses a nationally recognized open water scuba diving certificate. The permit shall be granted upon completion of requirements listed in Section 5.30 and is issued only following a demonstration of the required proficiency in diving. It is valid only for a limited time, as determined by the Diving Safety Officer. This permit is not to be construed as a mechanism to circumvent existing standards set forth in this standard.

Requirements of this section may be waived by the Diving Safety Officer if the candidate has demonstrated proficiency in diving and can contribute measurably

to a planned dive or project. A statement of the temporary diver's qualifications shall be submitted to the Diving Safety Officer as a part of the dive plan. Temporary permits shall be restricted to the planned diving operation and shall comply with all other policies, regulations, and standards of this standard, including medical requirements.

The DSO or his/her designee shall evaluate the diver and verify that he/she possesses skills and knowledge substantially similar to those stated in Sections 5.30.

The diver may dive only on the sponsoring project's diving operations, under the supervision of that project's Department certified divers.

Dives are limited to 60 feet, but the restricted diver may receive a 100-foot certification based on need, after application to the DSB. Such an application shall include records of a minimum of 12 dives completed with a Department diver holding at least a 100-foot certification (See section 5.51).

The restricted diver may only accompany another diver of the same or greater depth certification.

The restricted diver shall attend the next regularly scheduled Department certification course. In the event that attendance is not possible, as determined by the DSB, the restricted certification may be extended to the subsequent certification course.

The restricted diver will abide by all policies in this manual.

In addition to the standard certification requirements the restricted diver shall provide:

A written statement from a responsible person documenting the training, qualifications, and experience of the new diver (i.e., university, commercial diving, military, or other scientific organization) including the name of the person and contact information

A statement from the Department project leader describing the type of diving environment and duties the restricted diver shall be required to perform (areas, depths, and skills required)

Evaluation procedures will begin after receipt of the basic application package as specified under the standard certification process. The restricted diver candidate shall be evaluated to the standards of the general certification course. The candidate shall be evaluated for certification to a depth of 60 feet.

Upon the candidate's successful completion of the evaluation, the DSB will recommend and the DSO may certify that the candidate receive a restricted certification.

All DSB expenses associated with the restricted certification process including per diem will be the responsibility of the project requesting the certification.

5.30 REQUIREMENTS FOR DEPARTMENT DIVER CERTIFICATION

Only a person diving under Department auspices is eligible for Department Certification.

Submission of documents and participation in aptitude examinations does not automatically result in certification. The applicant must demonstrate to the Diving Safety Officer and members of the DSB that he/she is sufficiently skilled and proficient to be certified. The signature of the Diving Safety Officer or designee will acknowledge successful demonstration of a skill. Despite successful demonstration of skills, any applicant who does not possess the necessary judgment, under diving conditions, for the safety of the diver and their partner, may be denied Department scientific diving privileges. Minimum documentation and examinations required are as follows:

5.31 DOCUMENTS

The following documents will be submitted to the Diving Safety Officer at least two weeks prior to any diver certification course:

Application for scuba Diver Certification – Each applicant for diver certification shall submit an application completed by the candidate, signed by the candidate's supervisor, and by the Regional Manager/Division Chief/Assistant Chief.

Medical Approval -- Each applicant for diver certification shall submit a statement from a licensed physician, based on an approved medical examination, attesting to the applicant's fitness for diving (Section 6.00 and Appendices 1 through 3).

Proof of Training (Scientific Diver-In-Training Permit) -- Each applicant for Department diver certification shall submit proof of completion and certification of at least an open water scuba diver course through an internationally recognized certifying agency or scientific diving program, and has the knowledge, skills, and experience to be gained by successful completion of training as specified in Section 4.00. In addition, each applicant shall provide evidence of experience showing at least 12 open water dives in the previous 12 months.

The diver must also provide proof of the following Emergency Care Training:

- Current Cardio-Pulmonary Resuscitation (CPR) certification
- Current Emergency Oxygen Administration certification
- First Aid for diving accidents certification
- Open Water Rescue Diver certification

5.32 EVALUATION

The certification course will consist of approximately five consecutive days of increasingly technical diving experience and evaluation, under the supervision of the Diving Safety Officer and at least one other member of the Diving Safety Board. During the course, there will be no more than three new divers per DSB member.

The Diving Safety Board must be satisfied that the candidate is able to satisfactorily perform diving operations by observing performance in an appropriate series of qualifying tests.

5.32.1 THEORETICAL AND PRACTICAL TRAINING

The diver must complete additional theoretical aspects and practical training beyond the entry-level for a minimum cumulative time of 100 hours.

Theoretical aspects will include principles and activities appropriate to the intended area of scientific study.

Required Topics (include, but not limited to):

- Diving Emergency Care Training
 - Cardio-Pulmonary Resuscitation (CPR)
 - Standard or Basic First Aid
 - Recognition of DCS and AGE
 - Accident Management
 - Field Neurological Exam
 - Oxygen Administration
- Dive Rescue
- Dive Physics
- Dive Physiology
- Dive Environments
- Decompression Theory and its Application
- AAUS Scientific Diving Regulations and History
- Scientific Dive Planning
 - Coordination with other Agencies
 - Appropriate Governmental Regulations
- Scientific Method
- Data Gathering Techniques (Only Items specific to area of study are required)
 - Estimating Abundance using transects and quadrats
 - Mapping
 - Coring
 - Photography
 - Tagging
 - Collecting
 - Animal Handling
 - Archaeology
 - Common Biota
 - Organism Identification

- Behavior
- Ecology
- Site Selection, Location, and Re-location
- Specialized Equipment for data gathering

Hazardous Materials (Hazmat) Training

- High Pressure Cylinders
- Chemical Hygiene, Laboratory Safety (Use of Chemicals)

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

Specific Dive Modes (methods of gas delivery)

- Open Circuit
- Hookah
- Surface Supplied diving
- Small Boat Operation
- Rebreathers
- Closed Circuit
- Semi-closed Circuit
- Specialized Breathing Gas
- Nitrox
- Mixed Gas

Specialized Environments and Conditions

- Blue Water Diving,
- Ice and Polar Diving (Cold Water Diving)
- Zero Visibility Diving
- Polluted Water Diving,
- Saturation Diving
- Decompression Diving
- Overhead Environments
- Aquarium Diving
- Night Diving
- Kelp Diving
- Strong Current Diving (Live-boating)
- Potential Entanglement

Specialized Diving Equipment

- Full face mask
- Dry Suit
- Communications

Practical training must include a checkout dive, with evaluation of the skills listed in Section 5.32.5 (Open Water Evaluation), with the DSO or qualified DSB member followed by at least 11 ocean or open water dives in a variety of dive sites and diving conditions, for a minimum cumulative bottom time of 6 hours. Dives following the

checkout dive must be supervised by a qualified DSB member with experience in the type of diving planned, with the knowledge and permission of the DSO.

5.32.2 WRITTEN EXAMINATION

Prior to any open water training, each diver must successfully complete a written examination as prescribed by the DSB. The examination shall demonstrate knowledge of at least the following:

- Function, care, use, and maintenance of diving equipment
- Physics and physiology of diving
- Diving policies and precautions
- Near-shore currents and waves
- Dangerous marine animals
- Emergency procedures, including buoyant ascent and ascent by air sharing
- Currently accepted decompression procedures
- Demonstrate the proper use of dive tables
- Underwater communications
- Aspects of freshwater and altitude diving
- Hazards of breath-hold diving and ascents
- Planning and supervision of diving operations
- Diving hazards
- Causes, symptoms, treatment, and prevention of the following: near-drowning, air embolism, carbon dioxide excess, squeezes, oxygen poisoning, nitrogen narcosis, exhaustion and panic, respiratory fatigue, motion sickness, decompression sickness, hypothermia, and hypoxia/anoxia

5.32.3 EXAMINATION OF EQUIPMENT

- Personal diving equipment
- Task specific equipment

5.32.4 SWIMMING EVALUATION (POOL OR SIMILAR CONDITIONS)

The following tests must be completed and witnessed by a DSB member or designee at least two weeks prior to a scheduled certification course:

- Swim 400 yards, without swim aids, in less than 12 minutes
- Swim 25 yards continuously under water without swim aids
- Without the use of swim aids, perform a survival swim for ten minutes
- Surface dive to a depth of five yards without swim aids
- Recover a 15-pound weight from a depth of five yards without swim aids
- Without the use of swim aids, transport another person of equal or greater size a distance of 25 yards on the surface
- Other tests at the discretion of the DSB

5.32.5 OPEN WATER EVALUATION

The candidate must satisfy Diving Safety Board members of their ability to perform at least the following skills in open water:

- Surface dive to a depth of at least 15 feet in open water without scuba
- Enter and exit the water with full equipment from shore, dock, and vessel
- Clear facemask and regulator underwater
- Swim 400 yards in full scuba gear in the ocean, but not breathing from the scuba unit
- Demonstrate the ability to maneuver efficiently in an underwater environment while maintaining neutral buoyancy
- Complete a simulated emergency swimming ascent
- Complete a simulated emergency buoyant ascent
- Accurately navigate underwater
- Demonstrate the ability to swim at a constant stated depth while maintaining a compass course
- Demonstrate air sharing, including both buddy breathing and the use of alternate air source, as both donor and recipient, with and without a facemask
- Demonstrate ability to alternate between snorkel and scuba while kicking
- Demonstrate understanding of common underwater signs and signals
- Demonstrate simulated diver recovery and in-water mouth-to-mouth resuscitation
- Rescue and transport, as a diver, a passive simulated victim of an accident
- Demonstrate ability to remove and replace equipment while submerged
- Demonstrate diving ability that is acceptable to the instructor
- Demonstrate skin diving ability and proficiency with use of fins, use of mask, and use of snorkel
- Tow a diver in diving gear 500 feet at the surface
- Bail Out: With fins, mask, weighting system, and scuba unit (cylinder valve closed; regulator uncharged) in hands, and other diving gear on, jump off a floating platform. After submerging, don remaining gear under water
- Ditch and Don: Remove mask, snorkel, and scuba unit in 15 feet of water. Close cylinder valve, purge system, and make a controlled free ascent to the surface. Return to the gear on the bottom and put it on. Then make a normal ascent to the surface. In addition, an extended ditch and don, where the diver swims 15 feet across the bottom before donning gear, must be performed
- Demonstrate the ability to act as a Lead Diver by planning two dives, securing necessary safety and project equipment, briefing divers, completing the dive safely, and debriefing divers
- Successfully complete a night dive(s) to familiarize candidate with night diving situations
- Perform other skills as required by the DSB

A portion of the certification course may be devoted to accomplishing tasks which might be required during routine assignments (biological and geological transects, underwater collecting, equipment maintenance, underwater search and recovery, etc.).

Hazardous diving conditions will be simulated, including but not limited to: loss of air; loss of equipment; entanglement in kelp and lines; limited visibility, etc., to simulate conditions, which might arise during a working dive.

5.40 CERTIFICATION

Upon successful completion of the certification course and the written examination, the Diving Safety Board members present may recommend, and the Diving Safety Officer may certify the candidate as a Department diver to a depth of 60 feet.

5.50 DEPTH CERTIFICATIONS

A certified diver diving under the auspices of the Department may progress to the next depth level after successfully completing the required dives for the next level. Under these circumstances the diver may exceed their depth limit. Dives shall be planned and executed under the close supervision of a diver certified to this depth with the knowledge and permission of the Diving Safety Board. A diver may only exceed their depth certification by one step.

5.51 DEPTH CERTIFICATION LEVELS

Certification to 30 Foot Depth

This is the initial certification level, approved upon the successful completion of training listed in Section 5.30. This is informally granted during the certification course. It will be revoked if the certification course is not successfully completed.

Certification to 60 Foot Depth

A diver holding a 30-foot certificate may be certified to a depth of 60 feet after completing 12 logged dives to depths between 31 and 60 feet, for a minimum total bottom time of 4 hours. A diver holding a 60-foot or greater certification must closely accompany the diver.

Certification to 100 Foot Depth

A diver holding a 60-foot certificate may be certified to a depth of 100 feet after completing 12 logged dives to depths between 61 and 100 feet, for a minimum total bottom time of 2 hours. A diver holding a 100-foot or greater certification must closely accompany the diver.

Certification to 130 Foot Depth

A diver holding a 100-foot certificate may be certified to a depth of 130 feet after completing four dives deeper than 100 feet, for a minimum total bottom time of 1 hour. A diver with a 130-foot certification must closely accompany the diver and monitor the diver for obvious signs of gas narcosis. This certification will be issued by the DSO

based upon job requirements and justification of need. The diver shall carry and demonstrate the safe use of a fully redundant gas supply.

Certification to Depths Over 130 Feet

Dives over 130 feet are to be planned and performed as stage decompression dives. They are considered specialized diving mode dives. They require additional prerequisites, training, and equipment (Section 7.00). Certifications will only be considered for approval by the DSB based upon job requirements and justification of need

Certification to 165 Foot Depth

A diver holding a 130 foot certificate may be certified to a depth of 165 feet after successfully completing four dives to depths between 130 and 165 feet. The diver must also demonstrate knowledge of the special problems of deep diving and of special safety requirements.

Certification to 190 Foot Depth

A diver holding a 165 foot certificate may be certified to a depth of 190 feet after successfully completing four dives to depths between 165 and 190 feet.

Certification beyond 190 Foot Depth

The Department does not currently certify divers beyond a depth of 190 feet.

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

5.60 ANNUAL DIVER RECERTIFICATION

Each certified diver must pass an annual recertification course, which includes the following:

- Swim 400 yards without swim aids, in less than 12 minutes
- Swim 25 yards continuously under water without swim aids
- Without the use of swim aids, perform a survival swim for ten minutes
- Recover a 15-pound weight from a depth of five yards without swim aids
- Without the use of swim aids, transport another person of equal or greater size a distance of 25 yards on the surface
- Swim 400 yards in full dive gear in the ocean breathing off a snorkel
- Emergency medical courses or other review items at the discretion of the DSB

5.70 MAINTENANCE OF CERTIFICATION

5.71 MINIMUM ACTIVITY TO MAINTAIN CERTIFICATION

During a calendar year, each certified scientific diver must log a minimum of 20 dives. At least one dive must be logged near the maximum depth of the diver's certification during each 6 month period. Divers certified to 165 feet or deeper may satisfy these requirements with dives to 130 feet or over. Failure to meet these requirements is cause for revocation, restriction, or lowering of depth of certification.

Divers must complete the annual recertification course (Section 5.60).

Divers must maintain required logs and maintenance records (Sections 2.81, 2.82, and 3.61). Monthly logs must be submitted in a timely manner (Section 2.82).

For divers certified to use rebreathers, at least four rebreather dives must be made in a calendar year.

Once the initial certification requirements of Section 5.30 are met, divers whose depth certification has lapsed due to lack of activity may be re-qualified by procedures adopted by the Department's Diving Safety Board.

5.80 MEDICAL EXAMINATION

All divers shall pass a medical examination at the intervals specified in Section 6.11. After each major illness or injury, as described in Section 6, a diver shall receive clearance to return to diving from a physician before resuming dive activities.

5.90 CONSEQUENCES OF VIOLATION OF POLICIES

Lapse of certification or failure to abide by any of the requirements in this manual may result in informal counsel with the Diving Safety Officer, issuance of a Memorandum of Policy Violation, or restriction or revocation of certification (see Section 1.40). Section 1.40 also describes the process for appeal and the requirements for recertification after a lapse or revocation.

SECTION 6.00**MEDICAL STANDARDS****6.10 MEDICAL REQUIREMENTS****6.11 GENERAL**

Current certified divers and applicants for Department diver certification shall have on file with the DSO a current diving physical examination and have been declared by the examining physician to be fit to engage in diving activities or diving activities as limited or restricted in the medical evaluation report. All medical evaluations required by this standard shall be performed by, or under the direction of, a licensed physician. The physician may be of the diver's choice, preferably one trained in diving/undersea medicine.

The diver should be free of any chronic disabling disease and free of any conditions considered absolute contraindications to diving (Appendix 1).

6.12 SCHEDULE OF MEDICAL EVALUATIONS

Prior to acceptance for certification, each diver shall pass a diving physical examination.

Divers 39 years old and younger shall then pass a physical re-examination every three years.

Divers 40 years old and older shall then pass a physical re-examination every two years.

Results of the examination must be sent to the DSO on forms provided by the Department, including a certificate signed by a physician stating the diver is physically qualified for scuba diving (Appendices 1, 2, and 3). The Department will pay reasonable physical examination costs.

Divers may be granted a maximum 90 day grace period for delinquent re-examinations.

Following any major injury or illness or any condition requiring hospital care, clearance to return to diving must be obtained from a physician. If the injury or illness was pressure related, then the clearance to return to diving must come from a physician trained in diving medicine.

6.13 INFORMATION PROVIDED TO EXAMINING PHYSICIAN

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

6.14 CONTENT OF MEDICAL EVALUATIONS

Medical examinations conducted initially and at the intervals specified in Section 6.12 will consist of the following:

- Completed Applicant Agreement for Release of Medical Information to the Diving Safety Officer and the DSB (Appendix 2)
- Completed Diving Medical History Form (Appendix 3)
- Completed Diving Physical Examination Form (Appendix 2)

6.15 CONDITIONS WHICH MAY DISQUALIFY CANDIDATES FROM DIVING

The conditions listed in Appendix 1 (Diving Medical Exam Overview for the Examining Physician) may disqualify candidates from diving and should be considered by the examining physician.

6.16 LABORATORY REQUIREMENTS FOR DIVING MEDICAL EXAMINATION

The laboratory examinations tests listed in Appendix 2 (Medical Evaluation of Fitness for Scuba Diving Report) are required for initial and subsequent medical examinations. Additional requirements are indicated for divers over age forty.

6.17 PHYSICIAN'S WRITTEN REPORT

After any medical examination relating to an individual's fitness to dive, the Department shall obtain a written report prepared by the examining physician, which will contain the examining physician's opinion of the individual's fitness to dive, including any recommended restrictions or limitations (Appendix 2). This report shall be reviewed by the DSO.

The Department shall make a copy of the physician's written report available to the individual.

SECTION 7.00**SPECIALIZED DIVING MODES****7.10 GENERAL****7.11 SPECIALIZED DIVING MODES DEFINED**

The following dives are considered specialized diving modes:

- Conducted to depths over 130 feet
- Requiring staged decompression
- Conducted in a restricted overhead environment (cavern, cave, tunnel, ice, or shipwreck penetration)
- Conducted in blue water (open ocean, with bottom depth deeper than the diver's certified depth)
- Incorporating breathing gas mixtures other than air
- Involving delivery systems other than self-contained, open circuit systems (scuba)
- Diving with a dry suit
- Conducted at altitudes over 1,000 feet
- Conducted in swiftwater
- Tended or tethered diving
- Black water or extremely low visibility
- Light maintenance dives
- Conducted in petroleum contaminated water
- Conducted in any other particularly hazardous environments

7.12 PRIOR APPROVAL REQUIRED

Application to and approval by the DSO and/or additional training are required in order to use a specialized diving mode. The DSO may include further requirements for the use of specialized diving modes other than those listed in this chapter.

7.20 NITROX DIVING

The Diving Safety Program understands the potential benefits to Department divers who use Nitrox (also known as Enriched Air NITROX (EAN), EANx, SafeAir, etc.) for scuba dives. Generally speaking, Nitrox is a gas mixture of Nitrogen and Oxygen where the Oxygen content is higher than 20.9 percent.

The following guidelines address the use of Nitrox by scientific divers under Department auspices.

7.21 PREREQUISITES

7.21.1 ELIGIBILITY

Only a certified diver (Sections 4.00 and 5.00) diving under Department auspices is eligible for authorization to use Nitrox. After completion, review and acceptance of application materials, training and qualification as per these guidelines, an applicant will be authorized to use Nitrox within his/her depth authorization, and within safe Nitrox operating depths, as specified in Section 5.50. Documentation for authorization to use Nitrox should include a copy of course certification and a completed Diving with Nitrox Form (Appendix 9) sent to the DSO to be placed in the diver's file.

7.21.2 REQUIREMENTS FOR AUTHORIZATION TO USE NITROX

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

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

7.21.3 TRAINING

The diver must complete additional theoretical and practical training beyond the Scientific Diver certification level, to the satisfaction of the DSO and DSB.

7.21.4 EXAMINATIONS

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

Written examinations covering the information presented in the classroom training session(s) (i.e., gas theory, oxygen toxicity, and partial pressure determination).

Practical examinations covering the information presented in the practical training session(s) (i.e., gas analysis and documentation procedures).

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

7.21.5 MINIMUM ACTIVITY TO MAINTAIN AUTHORIZATION

The diver should log at least one (1) Nitrox dive per year. Failure to meet the minimum activity level may be cause for restriction or revocation of Nitrox authorization.

7.22 NITROX TRAINING GUIDELINES

Training in these guidelines should be in addition to training for Restricted Diver (Temporary Diver; Section 5.22) authorization. It may be included as part of training to satisfy the Scientific Diver training requirements (Section 5.30).

7.22.1 CLASSROOM INSTRUCTION

Topics should include, but are not limited to: review of previous training; physical gas laws pertaining to Nitrox; partial pressure calculations and limits; equivalent air depth (EAD) concept and calculations; oxygen physiology and oxygen toxicity; calculation of oxygen exposure and maximum safe operating depth (MOD); determination of decompression schedules (both by EAD method using approved air dive tables, and using approved Nitrox dive tables); dive planning and emergency procedures; mixing procedures and calculations; gas analysis; personnel requirements; equipment marking and maintenance requirements; dive station requirements.

The DSB may choose to limit standard Nitrox diver training to procedures applicable to diving, and subsequently reserve training such as Nitrox production methods, oxygen cleaning, and dive station topics to divers requiring specialized authorization in these areas.

7.22.2 PRACTICAL TRAINING

The practical training portion will consist of a review of skills as stated for scuba (Section 5.32.5), with additional training as follows:

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

7.22.3 WRITTEN EXAMINATION (BASED ON CLASSROOM INSTRUCTION AND PRACTICAL TRAINING)

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

- Function, care, use, and maintenance of equipment cleaned for Nitrox use

Physical and physiological considerations of Nitrox diving (e.g., O₂ and CO₂ toxicity)
Diving policies and procedures as related to Nitrox diving, either scuba or surface-supplied (depending on intended mode)
Given the proper information, calculation of:
 Equivalent air depth (EAD) for a given fO₂ and actual depth
 pO₂ exposure for a given fO₂ and depth
 Optimal Nitrox mixture for a given pO₂ exposure limit and planned depth
 Maximum operational depth (MOD) for a given mix and pO₂ exposure limit
 For Nitrox production purposes, percentages/psi of oxygen present in a given mixture, and psi of each gas required to produce a pO₂ by partial pressure mixing
Decompression Dive table and dive computer selection and usage
Nitrox production methods and considerations
Oxygen analysis
Nitrox operational requirements (Section 7.23), dive planning, and dive station components

7.22.4 OPEN WATER DIVES

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

7.22.5 SURFACE-SUPPLIED NITROX TRAINING

All training as applied to surface-supplied diving (practical, classroom, and open water) will follow the Department's surface-supplied diving standards, including additions listed in Section 7.60.

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

7.23 SCIENTIFIC NITROX DIVING POLICIES

7.23.1 DIVE PERSONNEL REQUIREMENTS

Nitrox Diver In Training - A Diver In Training, who has completed the requirements of Section 4.00 (Entry-level Training Requirements) and the Nitrox training and authorization requirements, may be authorized by the DSO to use Nitrox during training dives under the direct supervision a Scientific Diver who also holds Nitrox authorization. Dive depths should be restricted to those specified in the diver's authorization.

Scientific Diver - A Scientific Diver, who has completed the requirements of Section 5.00 (Scientific Diver Training) and the Nitrox training and authorization requirements, may be authorized by the DSO to use Nitrox. Depth authorization to use Nitrox should be

the same as those specified in the diver's authorization, and within safe Nitrox operating depths, as described in Section 5.61.

Lead Diver - On any dive during which Nitrox will be used by any team member, the Lead Diver should be authorized to use Nitrox, and hold appropriate authorizations required for the dive, as specified in AAUS Standards and Section 1.27. Lead Diver authorization for Nitrox dives by the DSO and/or DSB should occur as part of the dive plan approval process.

In addition to responsibilities listed in Section 1.27, the Lead Diver should:

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

As part of the pre-dive procedures, confirm with each diver the Nitrox mixture the diver is using. Also establish dive team maximum depth and time limits according to the shortest time limit or shallowest depth limit among the team members.

The Lead Diver should also reduce the maximum allowable pO_2 exposure limit for the dive team if on-site conditions so indicate (Section 7.24).

7.24 NITROX DIVING PARAMETERS

Oxygen Exposure Limits: The inspired oxygen partial pressure experienced at depth should not exceed 1.6 ATA. All dives performed using Nitrox breathing mixtures should comply with the current *NOAA Diving Manual* "Oxygen Partial Pressure Limits for 'Normal' Exposures"

The maximum allowable exposure limit should be reduced in cases where cold or strenuous dive conditions, or extended exposure times are expected. The DSB should consider this in the review of any dive plan application, which proposes to use Nitrox. The Lead Diver should also review on-site conditions and reduce the allowable pO_2 exposure limits if conditions indicate.

If using the equivalent air depth (EAD) method the maximum depth of a dive should be based on the oxygen partial pressure for the specific Nitrox breathing mix to be used.

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

Dive Tables and Gases: A set of DSB approved Nitrox dive tables should be available at the dive site. When using the equivalent air depth (EAD) method, dives should be conducted using air dive tables approved by the DSB. If Nitrox is used to increase the safety margin of air-based dive tables, the MOD and oxygen exposure and time limits for the Nitrox mixture being dived should not be exceeded.

Breathing mixtures used while performing in-water decompression, or for bail-out purposes, should contain the same or greater oxygen content as that being used during the dive, within the confines of depth limitations and oxygen partial pressure limits.

Department divers using Nitrox shall not exceed their ACTUAL depth certification unless accompanied by a diver with a deeper certification as provided in the Department Diving Safety Manual.

When diving with Nitrox at elevations greater than 1000 feet, divers should calculate profiles based on altitude adjustments first then augment with the Nitrox EAD.

Nitrox Dive Computers: Dive computers may be used to compute decompression status during Nitrox dives. Manufacturers' guidelines and operations instructions should be followed. Use of Nitrox dive computers should comply with dive computer guidelines included in the AAUS Standards. Nitrox dive computer users should demonstrate a clear understanding of the display, operations, and manipulation of the unit being used for Nitrox diving prior to using the computer, to the satisfaction of the DSO or designee. For more information, see <http://www.aaus.org>.

If Nitrox is used to increase the safety margin of an air-based dive computer, the MOD and oxygen exposure and time limits for the Nitrox mixture being dived should not be exceeded.

Dive computers capable of pO_2 limit and fO_2 adjustment should be checked by the diver prior to the start each dive to assure compatibility with the mix being used.

Repetitive Diving: Repetitive dives using Nitrox mixtures should be performed in compliance with procedures required of the specific dive tables used. Residual nitrogen time should be based on the EAD for the specific Nitrox mixture to be used on the repetitive dive, and not that of the previous dive.

The total cumulative exposure (bottom time) to a partial pressure of oxygen in a given 24 hour period should not exceed the current NOAA Diving Manual 24-hour Oxygen Partial Pressure Limits for "Normal" Exposures. When repetitive dives expose divers to different oxygen partial pressures from dive to dive, divers should account for accumulated oxygen exposure from previous dives when determining acceptable exposures for repetitive dives. Both acute (CNS) and chronic (pulmonary) oxygen toxicity concerns should be addressed.

7.25 OXYGEN PARAMETERS

Authorized Mixtures: Mixtures meeting the criteria outlined in Section 7.24 may be used for Nitrox diving operations, upon approval of the DSB.

Purity: Oxygen used for mixing Nitrox-breathing gas should meet the purity levels for "Medical Grade" (U.S.P.) or "Aviator Grade" standards.

In addition to the AAUS Air Purity Guidelines (Section 3.60), the following standard should be met for breathing air that is either:

- a. Placed in contact with oxygen concentrations greater than 40%.
- b. Used in Nitrox production by the partial pressure mixing method with gas mixtures containing greater than 40% oxygen as the enriching agent.

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

7.26 GAS MIXING AND ANALYSIS

Personnel Requirements: Individuals responsible for producing and/or analyzing Nitrox mixtures should be knowledgeable and experienced in all aspects of the technique. Only those individuals approved by the DSO and/or DSB should be responsible for mixing and/or analyzing Nitrox mixtures.

Production Methods: It is the responsibility of the DSB to approve the specific Nitrox production method used.

7.27 ANALYSIS VERIFICATION BY USER

It is the responsibility of each diver to analyze the oxygen content of their scuba cylinder prior to the dive and acknowledge in writing the following information for each cylinder: fO₂, MOD, cylinder pressure, date of analysis, and user’s name. Individual dive log reporting forms should report fO₂ of Nitrox used, if different than 21%.

7.28 NITROX DIVING EQUIPMENT

All of the designated equipment and stated requirements regarding scuba equipment required in the Department’s Diving Safety Manual and AAUS standards should apply to Nitrox scuba operations. Additional minimal equipment necessary for Nitrox diving operations include labeled, dedicated scuba cylinders and oxygen analyzers

7.28.1 OXYGEN CLEANING AND MAINTENANCE REQUIREMENTS

Requirements for Oxygen Service:

All equipment, which during the dive or cylinder filling process is exposed to concentrations greater than 40% oxygen at pressures above 150 psi, should be cleaned and maintained for oxygen service.

Equipment used with oxygen or mixtures containing over 40% by volume oxygen shall be designed and maintained for oxygen service. Oxygen systems over 125 psig shall have slow-opening shut-off valves. This should include the following

equipment: scuba cylinders, cylinder valves, scuba and other regulators, cylinder pressure gauges, hoses, diver support equipment, compressors, and fill station components and plumbing.

7.28.2 SCUBA CYLINDER IDENTIFICATION MARKING

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

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

Nitrox identification color-coding should include a 4-inch wide green band around the cylinder, starting immediately below the shoulder curvature. If the cylinder is not yellow, the green band should be bordered above and below by a 1-inch yellow band.

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

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

A contents label should be affixed, to include the current fO_2 , date of analysis, and MOD.

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

7.28.3 REGULATORS

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

7.28.4 OTHER SUPPORT EQUIPMENT

An oxygen analyzer is required which is capable of determining the oxygen content in the scuba cylinder. Two analyzers are recommended to reduce the likelihood of errors due to a faulty analyzer. The analyzer should be capable of reading a scale of 0 to 100% oxygen, within 1% accuracy.

All diver and support equipment should be suitable for the fO_2 being used.

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

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

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

7.30 STAGED DECOMPRESSION DIVING

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

The following procedures shall be observed when conducting planned decompression stops.

7.30.1 DIVES SHALLOWER THAN 130 FEET

Staged Decompression dives performed shallower than 130 feet shall only be made with prior approval of the Diving Safety Officer. They must also meet the requirements of this section.

7.30.2 DIVES DEEPER THAN 130 FEET

Divers must be able to justify operational necessity for dives deeper than 130 feet.

All dives greater than 130 feet will be considered staged decompression diving. The training, equipment and operational requirements for staged decompression diving (Sections 7.31-7.33) must be followed. Before the dives occur, the diver must show appropriate competence to work at depth in a hyperbaric chamber test.

7.30.3 DIVES DEEPER THAN 150 FEET

Dives deeper than 150 feet will be considered on an individual basis. Due to the training and gear requirements of dives deeper than 150 feet, however, an explanation of why alternative resources (such as contracted commercial divers) are not being used must be submitted to and approved by the DSO.

7.31 MINIMUM EXPERIENCE AND TRAINING REQUIREMENTS

Prerequisites:

Scientific Diver qualification according to Section 5.00

Minimum of 100 logged dives

Demonstration of the ability to safely plan and conduct dives deeper than 100 feet

Nitrox certification/authorization is recommended

Training shall be appropriate for the conditions in which dive operations are to be conducted

Minimum Training shall include the following:

A minimum of 6 hours of classroom training to ensure theoretical knowledge to include: physics and physiology of decompression; decompression planning and procedures; gas management; equipment configurations; decompression method, emergency procedures.

It is recommended that at least one training session be conducted in a pool or sheltered water setting, to cover equipment handling and familiarization, swimming and buoyancy control, to estimate gas consumption rates, and to practice emergency procedures.

A minimum of six open-water training dives simulating/requiring decompression shall be conducted, emphasizing planning and execution of required decompression dives, and including practice of emergency procedures.

Progression to greater depths shall be by 4-dive increments at depth intervals as specified in Section 5.40.

No training dives requiring decompression shall be conducted until the diver has demonstrated acceptable skills under simulated conditions.

The following are the minimum skills the diver must demonstrate proficiently during dives simulating and requiring decompression:

- Buoyancy control
- Proper ascent rate
- Proper depth control
- Equipment manipulation
- Stage/decompression bottle use as pertinent to planned diving operation
- Buddy skills
- Gas management
- Time management
- Task loading
- Emergency skills

Divers shall demonstrate to the satisfaction of the DSO or the DSO's designee proficiency in planning and executing required decompression dives appropriate to the conditions in which diving operations are to be conducted.

Divers shall document training in staged decompression diving appropriate for the conditions in which dive operations are to be conducted. Such documentation shall be to the satisfaction of the DSO. Training shall be conducted by agencies or instructors approved by the DSO.

Upon completion of training, the diver shall be authorized to conduct required decompression dives with DSO approval.

7.32 EQUIPMENT REQUIREMENTS

Cylinder, valve, regulator, and pressure gauge systems for primary (bottom) gas supplies will be configured in a redundant manner that allows continuous breathing gas delivery in the event of failure of any one component of the system.

Cylinders will be of such volume and configuration adequate for planned diving operations.

One of the second stages on the primary gas supply will be configured with a hose of adequate length to facilitate effective emergency gas sharing in the intended environment.

Additional dive equipment shall include:

- Diver signaling and location devices adequate for the planned diving operations and environment
- Lines, line reels, lift bags and floats as necessary to hold a diver at required decompression stop depths
- Compass
- Snorkel is optional at the DSB's discretion, as determined by the conditions and environment

Redundancy in the following components is desirable and may be required at the discretion of the DSO:

- Dive Computers or Decompression Calculation Devices
- Dive Timing Devices
- Depth Gauges
- Buoyancy Control Devices
- Cutting Devices
- Lift Bags and Line Reels

7.33 MINIMUM OPERATIONAL REQUIREMENTS

Approval of dive plan applications to conduct required decompression dives shall be on a case-by-case basis.

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

Divers' gas supplies will be adequate to meet planned operational requirements and foreseeable emergency situations. Plans will call for a "Rule of Thirds" where one third of the bottom gas supply is held in reserve.

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

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

Emergency procedures approved by the DSO for loss of gas supply, equipment malfunction, unexpected conditions, or dive team separation must be developed and included in the application. Divers shall review emergency procedures prior to each diving day.

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

The maximum depth for required decompression using air as the bottom gas will be 190 feet.

Use of additional Nitrox and/or high fO_2 decompression mixtures as travel and decompression gases to decrease decompression obligations is encouraged. However additional training and equipment may be required.

Use of alternate inert gas mixtures (commonly referred to as mixed gases) to limit narcosis is encouraged for depths greater than 150 feet providing the diver has sufficient training in their use. (Currently, no Department divers are authorized to use alternate inert gas mixtures).

If a period of more than 6 months has elapsed since the last mixed gas dive, a progressive series of practice dives prior to the start of project diving operations is recommended to return the diver(s) to proficiency.

7.40 RESTRICTED OVERHEAD ENVIRONMENTS

Restricted overhead environments include any diving environment in which a direct ascent to the surface is impeded by a physical barrier including; caves, caverns, ice, and shipwreck penetration. It does not include underwater arches, lava tubes, opened shipwrecks or kelp forests, in which:

- Two divers can easily swim abreast
- There is no significant danger of entrapment or entanglement
- Loss of visibility due to siltation is unlikely

7.41 TRAINING REQUIREMENTS

Divers shall document training in restricted overhead environment diving appropriate for the conditions in which dive operations are to be conducted.

Divers shall demonstrate to the satisfaction of the DSO or a designee, proficiency in planning and executing dives in a restricted overhead environment appropriate to the conditions in which diving operations are to be conducted.

7.42 EQUIPMENT REQUIREMENTS

Divers shall employ a continuous guideline from a point outside the restricted overhead environment to their position.

Divers shall use redundant breathing gas systems while in restricted overhead environments. Redundant breathing gas delivery systems will be designed such that no single component failure can prevent access by the diver to an appropriate breathing gas supply.

An alternate second stage will be included with a hose of adequate length to facilitate emergency gas sharing while swimming in a single file formation.

Each diver shall carry a minimum of three lights.

The DSO may require redundancy in other equipment systems to ensure dive team safety, including:

- Dive Computers or Decompression Calculation Devices
- Dive Timing Devices
- Depth gauges
- Buoyancy Control Devices

7.43 OPERATIONAL REQUIREMENTS

Divers shall immediately exit a restricted overhead environment when a light source or a required piece of equipment fails or malfunctions.

Divers shall begin exiting the overhead environment when any member of the dive team reaches two-thirds of his/her starting primary breathing gas supply (“the Rule of Thirds”).

Where an enclosed or confined space is not large enough for two divers, a diver shall be stationed at the underwater point of entry, an orientation line shall be used, and an emergency breathing gas supply will be available at the point of entry.

Emergency procedures for loss of gas supply, equipment malfunction, team separation, unexpected diving conditions and loss of visibility must be developed. The divers must review emergency procedures prior to each dive.

7.44 ADDITIONAL REQUIREMENT FOR ICE AND POLAR DIVING

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

7.50 BLUE WATER DIVING

Blue water diving is defined as diving conducted in any body of water in which there is no physical bottom within diving depth ranges. According to AAUS this is water “generally greater than 200 feet deep”. It requires special training and the use of multiple-tethered diving techniques. The following policies have been derived from, Blue water Diving Guidelines (Heine, J.N., Ed., 1986. California Sea Grant College Program Publication No. T-CSGCP-014). Exceptions to this may be made on a case-by-case basis, if a risk of diver entanglement with other structures exists, or when there are other means of physical control. Procedures for diver control and communication must be developed to the satisfaction of the DSO.

7.51 TRAINING REQUIREMENTS

The diver shall complete practical training in blue water diving techniques, and demonstrate proficiency to the satisfaction of the DSO or a designee. This training shall include:

- Blue water diving equipment deployment
- Entry procedures
- Buoyancy control and awareness
- Diver communication
- Out-of-air procedures
- Dangerous marine life defensive techniques
- Exit procedures
- Entanglement procedures
- Emergency communication and protocols

7.52 EQUIPMENT REQUIREMENTS

Divers shall employ a down-line and counterweighted trapeze line system in order to maintain diver contact and depth control.

The total weight in water of the down-line and tether array will be no greater than 10 pounds.

All diver tether attachments will be made with connectors that can be quickly released by the diver while the line is under a tension at least equivalent to the weight of the entire array.

Attachments must be to either the diver’s buoyancy compensator, or to a separate harness, but not to the diver’s weight belt.

7.53 OPERATIONAL REQUIREMENTS

A safety diver shall be stationed at the trapeze attachment point. This diver’s functions are monitoring and controlling the dive team, and monitoring the diving environment for

potential hazards. This diver shall be authorized to terminate diving operations for any or all members of the dive team.

A lookout/boat operator shall be stationed aboard any vessel from which blue water diving is conducted as long as divers are in the water.

7.60 SURFACE-SUPPLIED AND HOOKAH DIVING

Surface-supplied dives will comply with all scuba diving procedures in this manual. This includes applicable policies listed elsewhere in this chapter (Staged Decompression, Nitrox, etc.). Surface-supplied will not be conducted at depths greater than 190 feet.

Divers using the surface-supplied mode shall be equipped with a diver-carried independent reserve breathing gas supply.

Divers using the surface-supplied mode shall maintain voice communication with the surface tender.

Each surface-supplied diver shall be tended by a separate dive team member while in the water.

In the case of a tethered diver with direct communication to the surface, the buddy may be a fully suited diver on the surface, prepared to assist.

7.61 TRAINING REQUIREMENTS

Divers shall satisfy the DSO that they possess the required training, skills, and knowledge to conduct surface-supplied operations.

7.62 EQUIPMENT REQUIREMENTS

Specific equipment requirements will be reviewed and defined by the DSO on a case-by-case basis. Equipment maintenance, repair, and record keeping will comply with the requirements of this manual.

7.63 OPERATIONAL REQUIREMENTS

While in the water, each diver shall be assisted by a separate trained tender.

The surface-supplied breathing gas supply must be sufficient to support all surface-supplied divers in the water for the duration of the planned dive, including decompression, as well as providing for emergencies.

During operations when only one surface-supplied diver is in the water, there must be a fully equipped standby diver in attendance at the dive location.

7.70 LIGHT MAINTENANCE DIVING

7.71 OPERATIONAL REQUIREMENTS

Job Hazard Analysis (JHA) - Before undertaking any underwater task, a Job Hazard Analysis (JHA) shall be performed. The purpose of the Job Hazard Analysis is to identify hazards associated with each step of a job, and to develop solutions that will either eliminate or guard against the hazard. Required portions of the JHA are:

- Sequence of Basic Job Steps

- Potential Hazards

- Safe Procedures and Protection

- Responsibility Assignments

- Personnel Assignments

- Underwater Hazards including, but not limited to:

 - Potential for diver fouling or entrapment

 - Differential pressure hazards including but not limited to underwater discharges, dredging, major intakes, pumps, sluices, suction or valve culverts

 - Hazardous energy situations including but not limited to active cathodic protection, high intensity sonar, propellers, pumps, vessels, or any mechanical apparatus whose inadvertent operation would be hazardous to the diver (All such devices shall be deactivated and their controls tagged prior to the commencement of the diving operation.)

 - Diving in contaminated liquid, including but not limited to chemical, microbiological, or radiological contamination or any thermal or toxic threat to the diver

 - Limited access or penetration situations such as entering a pipe, tunnel, wreck, or similarly enclosed or confining structure (other than a habitat). These situations shall require an underwater tender at the point of entry and that divers are equipped with an appropriate diver-carried reserve gas breathing supply

 - Operations involving explosives

The JHA should be reviewed and updated periodically whenever new equipment or procedures are introduced into the work site. This is especially true if an accident has occurred previously.

Decompression Chambers are required for any Light Maintenance dive in excess of 80 fsw or requiring stage decompression. On site chambers must have a minimum capability of compression to 6 ATA (equivalent to 165 fsw).

Stand-by Divers, when assigned, will be on deck, suitably equipped, and ready to dive.

A Diver-Carried Reserve Breathing Supply must be provided when diving deeper than 60 fsw, on dives requiring decompression regardless of depth, when direct ascent to the surface is not available, or when bell diving, except where heavy gear is worn.

A diver-carried reserve breathing gas supply shall supply a physiologically appropriate mixture for the depths involved.

Diver-carried reserve breathing gas supplies must provide a positive indication to the diver that his reserve has been actuated. Such an indication can be the requirement for the diver to open a valve, a visual signal or other appropriate methods.

The diver-carried reserve breathing gas supply shall be of sufficient duration for use until the diver can reach the surface, reach another source of breathing media or be reached by the standby diver equipped with another source of breathing media.

In all cases the activation of a diver-carried reserve breathing gas supply shall cause the dive to be aborted. The reason for activation of the diver's reserve must be ascertained and corrected prior to continued use of the involved equipment.

Two-way Audio Communications between the diver and tender shall be used on Light Maintenance dives. Audio-communication is not required for scuba operations, where the team may use either safety line pull signals when diving tethered, or an in-water buddy team.

ANSI approved Personal Protective Equipment shall be worn when required. These items include but are not limited to: protective head gear, protective foot-wear, protective eye-wear, personal flotation devices, hearing protection, harness with approved double locking elastic lanyard, and respiratory equipment.

7.80 PETROLEUM CONTAMINATED WATER DIVES

All diving operations in a petroleum contaminated environment will be conducted as part of the standard Incident Command System, incorporating a Diving Operations function at an organizational level appropriate to the incident size. Refer to the OIL SPILL FIELD OPERATIONS GUIDE, ICS-OS-420-1. This is not a guideline for diving in biologically or chemically hazardous conditions.

7.81 OPERATIONAL REQUIREMENTS

Prior to conducting the dive the following shall be obtained and/or completed:

- The type of pollutant and the Material Safety Data Sheet (MSDS)
- Ensure that active discharge (under pressure) has stopped; the source controlled
- Identification of the chemical hazards and precautions, see MSDS
- Determine who controls vessel operations and the operation of any suspect vessel and/or equipment (valves, screens, gates or other mechanical hazards)
- Completion of the Site Safety Plan and the Medical Plan
- Notify the appropriate Department Industrial Hygienist

Based on the above information the dive team leader will submit a dive plan to the Incident Command for approval and incorporation into the Incident Action Plan. The following points should be considered in the dive plan:

Response vessel operations

Ensure that all in/under water equipment on the subject vessel or location are secured (shut off/down). For a commercial vessel or vessel subject to pilotage have the Master or Watch Officer fly the alpha code flag and note so in the ships log. For storm drain discharges have the operator "Lock out and Tag" all automatic or manually activated pumps, gates and valves

Contaminated diver procedures

Dive purpose and activities

Known hazards and procedures to avoid contamination

When enforcement (WPD) is conducting covert or otherwise secret operations exceptions to the above may be made providing that:

A dive plan is still formulated and encompasses the above listed hazards and safety considerations.

Personal or public safety must not be jeopardized to perform the operation.

When an Incident Command System is not in place (such as in a Natural Resource Damage Assessment) it must be activated prior to diving.

7.90 CLOSED CIRCUIT AND SEMI-CLOSED CIRCUIT SCUBA (REBREATHERS)

7.91 GENERAL CONSIDERATIONS

Semi-Closed Circuit diving equipment is not approved at this time for Department dives with the exception of use for field evaluation with prior permission of the DSO.

Oxygen partial pressure in the breathing gas shall not exceed values approved by the Department's DSB. The accepted maximum value is 1.6 atmospheres pO₂. This limits the depth of 100% oxygen rebreathers to less than 20 feet.

Chemicals used for the absorption of carbon dioxide shall be kept in a cool, dry location in a sealed container until required for use.

The designated person-in-charge shall determine that the carbon dioxide absorption canister and/or absorption material is/are used in accordance with the manufacturer's instructions.

Closed and semi-closed diving equipment will not be used at a depth greater than that recommended by the manufacturer of the equipment.

7.92 CLOSED CIRCUIT REBREATHERS

Closed circuit underwater breathing apparatus (CCUBA), or rebreathers, are defined as any device that re-circulates some or all of the exhaled gas in a breathing loop and returns it to the diver.

The Draeger LAR V Closed Circuit Rebreather is currently the only rebreather approved for use by Department divers. It is only approved for marine mammal capture activities, associated training, and proficiency dives. Other closed circuit diving equipment may be used for field evaluation dives with the prior permission of the DSO.

7.93 TRAINING REQUIREMENTS

Specific training requirements for rebreather use will be defined by the DSO. General requirements are as follows:

Scuba certification and active status as a Diver are required. Divers must have completed a minimum of 100 open-water dives on scuba prior to engaging in rebreather diving activity.

Training in the use of Nitrox is recommended.

Divers must satisfactorily complete a rebreather-training program authorized by the manufacturer or equivalent training approved by the DSO or a designee.

Divers must demonstrate to the DSO or a designee proficiency in pre-dive, dive, and post-dive operational procedures for the particular model of rebreather to be used.

Divers must demonstrate to the DSO or a designee proficiency in bailout procedures, including problem recognition, manual system control, flooded breathing loop recovery, absorbent canister failure, and alternate bailout options.

If the rebreather is to be serviced and maintained by the diver, the diver must demonstrate to the DSO or a designee proficiency in proper system maintenance, including full breathing loop disassembly and cleaning (mouthpiece, check-valves, hoses, counterlung, absorbent canister, etc.), oxygen sensor change out, and other tasks required by specific rebreather models.

Diving experience with the particular model of rebreather to be used will include a minimum of 25 dives underwater, of which at least 20 dives will have been in open-water conditions, and at least 5 dives to the proposed operating depth, except as provided for evaluation in Section 7.91.

7.94 GENERAL OPERATIONAL REQUIREMENTS

The oxygen partial pressure in the breathing gas will not exceed 1.6 atmospheres. Dive depth will not exceed 20 feet using the Draeger LAR V.

Rebreather equipment will be used and maintained in accordance with the specifications of the manufacturer as is practical, including pre- and post-dive procedures and operational limits (e.g., depth, water temperature, etc.). Chemicals used for the absorption of carbon dioxide will be kept in a cool, dry location in a sealed container until required for use.

All rebreather divers shall have at their disposal an alternate means to return to the surface in the event of a catastrophic, unrecoverable breathing loop failure (e.g., a second rebreather system, or sufficient open-circuit gas supply).

**APPENDIX 1
DIVING MEDICAL EXAM OVERVIEW FOR THE EXAMINING PHYSICIAN**

TO THE EXAMINING PHYSICIAN:

This person, _____, requires a medical examination to assess their fitness for certification as a Scientific Diver for the California Department of Fish and Game. Their answers on the Diving Medical History Form (attached) may indicate potential health or safety risks as noted. Your evaluation is requested on the attached Scuba Diving Fitness Medical Evaluation Report. If you have questions about diving medicine, you may wish to consult one of the references on the attached list or contact one of the physicians with expertise in diving medicine whose names and phone numbers appear on an attached list. Please contact the undersigned Diving Safety Officer if you have any questions or concerns about diving medicine or the California Department of Fish and Game standards. Thank you for your assistance.

Diving 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, judgment, emotional stability, or physical fitness. Please consult the following list of conditions that usually restrict candidates from diving.

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

CONDITIONS WHICH MAY DISQUALIFY CANDIDATES FROM DIVING

1. Abnormalities of the tympanic membrane, such as perforation, presence of a monomeric membrane, or inability to autoinflate the middle ears. [5 ,7, 8, 9]
2. Vertigo including Meniere’s Disease. [13]
3. Stapedectomy or middle ear reconstructive surgery. [11]
4. Recent ocular surgery. [15, 18, 19]
5. Psychiatric disorders including claustrophobia, suicidal ideation, psychosis, anxiety states, untreated depression. [20 - 23]
6. Substance abuse, including alcohol. [24 - 25]
7. Episodic loss of consciousness. [1, 26, 27]
8. History of seizure. [27, 28]
9. History of stroke or a fixed neurological deficit. [29, 30]
10. Recurring neurological 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. Hematological disorders including coagulopathies. [41, 42]

15. Evidence of coronary artery disease or high risk for coronary artery disease¹. [33 - 35]
16. Atrial septal defects. [39]
17. Significant valvular heart disease - isolated mitral valve prolapse is not disqualifying. [38]
18. Significant cardiac rhythm or conduction abnormalities. [36 - 37]
19. Implanted cardiac pacemakers and cardiac defibrillators (ICD). [39, 40]
20. Inadequate exercise tolerance. [34]
21. Severe hypertension. [35]
22. History of spontaneous or traumatic pneumothorax. [45]
23. Asthma². [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]

SELECTED REFERENCES IN DIVING MEDICINE

Most 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, Fourth Edition, 2004 A. Bove and J. Davis. W.B. Saunders Company, Philadelphia
- DIVING AND SUBAQUATIC MEDICINE, Fourth Edition, 2002. C. Edmonds, C. Lowery, J. Pennefather and R. Walker. Arnold (Hodder Headline Group), London
- 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.

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.

**APPENDIX 2
MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING REPORT**

Name of Applicant (Print or Type)

Date (Mo/Day/Year)

To The PHYSICIAN:

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

TESTS: Please initial that the following tests were completed.

[] Initial Examination

- _____ Medical History
- _____ Complete Physical Exam with emphasis on neurological and otological components
- _____ Chest X-Ray
- _____ Spirometry
- _____ Hematocrit or Hemoglobin

- _____ Urinalysis
- _____ Any further tests deemed necessary by the physician

Additional testing for first over age 40

- _____ Resting EKG
- _____ Assessment of coronary artery disease using Multiple-Risk-Factor Assessment¹
(age, lipid profile, blood pressure, diabetic screening, smoker) Note: Exercise stress testing may be indicated based on risk factor assessment²

[] Re-examination

(Every 3 yrs < age 40; 2 yrs 40 and older)

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

Additional testing for over age 40

- _____ Resting EKG
- _____ Assessment of coronary artery disease using Multiple-Risk-Factor Assessment¹
(age, lipid profile, blood pressure, diabetic screening, smoker) Note: Exercise stress testing may be indicated based on risk factor assessment²

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>

RECOMMENDATION:

APPROVAL. I find no medical condition(s) that I consider incompatible with diving.

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

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

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

REMARKS:

PHYSICIAN'S STATEMENT:

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

Signature _____, M.D.

Date _____

Name (Print or Type)

Address

Telephone Number

My familiarity with applicant is:

____ With this exam only

____ Regular Physician for ____ years

____ Other (describe) _____

My familiarity with diving medicine is:

APPLICANT'S RELEASE OF MEDICAL INFORMATION FORM

I authorize the release of this information and all medical information subsequently acquired in association with my diving to the California Department of Fish and Game Diving Safety Officer and Diving Safety Board or their designee at (place) _____ on (date) _____.

Signature of Applicant _____

**APPENDIX 3
DIVING MEDICAL HISTORY FORM**

(To Be Completed By Applicant-Diver)

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

Sponsor: California Department of Fish & Game Date: ____/____/____
(Mo/Day/Yr)

TO THE APPLICANT:

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

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

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

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

	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 neurological disorders, including transient ischemic attacks.			
10.	Aneurysms or bleeding in the brain.			
11.	Decompression sickness or embolism.			
12.	Head injury.			
13.	Disorders of the blood, or easy bleeding.			
14.	Heart disease, diabetes, high cholesterol.			
15.	Anatomical heart abnormalities including patent foramen ovale, valve problems, etc.			
16.	Heart rhythm problems.			
17.	Need for a pacemaker.			
18.	Difficulty with exercise.			
19.	High blood pressure.			
20.	Collapsed lung.			

21.	Asthma.			
22.	Other lung disease.			
23.	Diabetes mellitus.			
24.	Pregnancy.			
25.	Surgery. If yes explain below.			
26.	Hospitalizations. If yes explain below.			
27.	Do you take any medications? If yes list below.			
28.	Do you have any allergies to medications, foods, and 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

APPENDIX 4 DEFINITION OF TERMS

Air sharing - Sharing of an air supply between divers.

ATA(s) - "Atmospheres Absolute", Total pressure exerted on an object, by a gas or mixture of gases, at a specific depth or elevation, including normal atmospheric pressure.

Bottom Time - The total elapsed time measured in minutes from the time when the diver leaves the surface in descent to the time the diver returns to the surface in ascent. This includes safety stops and ascent time. This is also what a computer or watch will record for the dive profile.

Breath-hold Diving - A diving mode in which the diver uses no self-contained or surface-supplied air or oxygen supply.

Buddy Breathing - Sharing of a single air source between divers.

Buddy Diver - Second member of the dive team.

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

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

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

Certified Diver - A diver who holds a recognized valid certification from the Department or another AAUS Organizational Member.

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

Cylinder - A pressure vessel for the storage of gases.

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

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

Deep Stop - An additional decompression stop added to a deep dive profile at approximately half the maximum depth of the dive. Deep stops are theorized to have beneficial effects on off gassing gradients.

Dive - An entry, a descent into the water, an underwater activity using compressed gas, a return to the surface an exit, and a minimum ten minute surface interval.

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

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

Dive Site - Physical location of a diver during a dive.

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

Diver - An individual in the water who uses apparatus, including snorkel, which supplies breathing gas at ambient pressure. A Department employee may not dive on Department time or use Department diving equipment unless certified by the DSO as a diver.

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

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

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

Diving Safety Board (DSB) - Group of individuals who act as the official representative of the membership organization in matters concerning the scientific diving program (Section 1.24). Synonymous with Diving Control Board.

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

EAD – See Equivalent Air Depth below.

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

Enriched Air Nitrox (EANx) - A name for a breathing mixture of air and oxygen when the percent of oxygen exceeds 21%. This term is considered synonymous with the term “Nitrox” (Section 7.20).

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

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

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

FFW – Feet of freshwater, or equivalent static head.

FSW - Feet of seawater, or equivalent static head.

Hookah Diving - A type of shallow water surface-supplied diving where there is no voice communication with the surface.

Hyperbaric Chamber - See decompression chamber.

Hyperbaric Conditions - Pressure conditions in excess of normal atmospheric pressure at the dive location.

Law Enforcement/Public Safety Dive - Law enforcement or public safety dives are those made in the course of enforcing regulations or laws or assisting in emergency response by, or under the direction of, a peace officer or emergency personnel.

Lead Diver - Certified scientific diver with experience and training to conduct the diving operation. The lead diver is responsible for coordinating diving activities for the diving operation. The lead diver is generally the most experienced diver on site and maintains the overall safety of the diving operation.

Light Maintenance Dive - Light Maintenance Dives are those made to perform routine or emergency maintenance on, repair, or installation of equipment to a vessel or structure, recover or salvage items other than those used in a scientific or public safety investigation (evidence recovery), or to conduct routine monitoring activities at a hazardous material investigation that is not part of a scientific or public safety investigation.

Maximum Working Pressure - Maximum pressure to which a pressure vessel may be exposed under standard operating conditions.

Organizational Member - An organization which is a current member of the AAUS, and which has a program, which adheres to the standards of the AAUS as, set forth in the AAUS Standards for Scientific Diving Certification and Operation of Scientific Diving Programs.

Maximum Operating Depth (MOD) - The maximum allowable working depth for a given breathing gas. Usually determined as the depth at which the pO₂ for a given gas mixture reaches a predetermined maximum.

Mixed Gas - A breathing gas other than air. Generally used to refer to combinations of oxygen with varying levels of inert gasses used to increase the maximum operating depth.

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

MSW - Meters of seawater or equivalent static head.

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

NOAA Diving Manual - Refers to the NOAA Diving Manual, Diving for Science and Technology, 2001 edition. National Oceanic and Atmospheric Administration, Office of Undersea Research, US Department of Commerce.

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

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

Oxygen Clean - All combustible contaminants have been removed.

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

Oxygen Service - A gas delivery system that is both oxygen clean and oxygen compatible.

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

Oxygen Toxicity Unit (OTU) - 1 minute of breathing 100% oxygen at sea level. Since it has been observed that most people can tolerate 24 hours of breathing pure oxygen without trouble, the accepted allowable dose is 1440 OTU's (1 OTU per min x 60 min/hr x 24 hr/ day) per day

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

Pressure Vessel - See cylinder.

pN₂ - Inspired partial pressure of nitrogen, usually expressed in units of atmospheres absolute.

pO₂ - Inspired partial pressure of oxygen, usually expressed in units of atmospheres absolute.

Psi - Unit of pressure, “pounds per square inch.

Psig - Unit of pressure measured by a gauge, “pounds per square inch gauge.

Recompression Chamber - see decompression chamber.

Scientific Diving - Scientific diving is defined (29CFR1910.402) as diving performed solely as a necessary part of a scientific, research, or educational activity by employees whose sole purpose for diving is to perform scientific research tasks.

Scuba Diving - A diving mode independent of surface supply in which the diver uses open circuit self-contained underwater breathing apparatus.

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

Surface Supplied Diving - A diving mode in which the diver in the water is supplied from the dive location with compressed gas for breathing.

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

Training Dive - Training dives are those in which divers participate in order to fulfill certification or instructional requirements. They are also conducted to maintain

proficiency. Training dives conducted outside Department auspices on Department time must be approved by the DSO.

Umbilical - Composite hose bundle between a dive location and a diver or bell, or between a diver and a bell, which supplies a diver or bell with breathing gas, communications, power, or heat, as appropriate to the diving mode or conditions, and includes a safety line between the diver and the dive location.

Working Pressure - Normal pressure at which the system is designed to operate.

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**APPENDIX 5
REQUEST FOR DIVING RECIPROCITY FORM
VERIFICATION OF DIVER TRAINING AND EXPERIENCE**

The visiting diver will comply with the diving policies of the host organization's Diving Safety Manual unless previously arranged by both organizations' Diving Safety (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 (Agency) _____
- _____ 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 with the California Department of Fish & Game.

Diving Safety Officer: _____ (Signature) _____ (Date)

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APPENDIX 6
DIVING INJURY/INCIDENT REPORT FORM

Required Incident Reporting: All diving incidents requiring recompression treatment, or resulting in moderate or serious injury, or death shall be reported the DSB. The report will specify the circumstances of the incident and the extent of any injuries or illnesses. This form is confidential and for statistics purposes only.

Check the appropriate space(s) & complete the form:

- ___ Simple Illness ___ Referred to Physician ___ Serious injury
___ Barotrauma ___ Hyperbaric Treatment ___ Near Drowning
___ Hyperoxic ___ Hypercapnea ___ Fatality
Workers' Compensation Claim Yes ___ No ___ ___ Other: _____

Descriptive Report (use additional sheets if necessary)

Date of Incident: ___ / ___ / ___
Month/Day/Year

Circumstances and the extent of the injuries or illnesses:

Treatment provided and results:

Recommendations to avoid repetition of incident:

Name & Title of Person Submitting Report: _____
(Please print)

Signature _____ Date ___ / ___ / ___

Mailing Address _____

Telephone/FAX _____ e-mail _____

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APPENDIX 7
DEPARTMENT REPORT OF MINOR INJURY

Name SSN Date of Birth Sex (M/F)

Region/Division/Branch/Office

Address of Region/Division/Branch/Office

Location Where Injury Occurred

Classification Date of Injury Time of Injury Date Injury Reported

Describe the Injury and How it Occurred (include part of body affected)

Treatment

Comments

Signature of Injured

Signature of Supervisor

Dated

Dated

INSTRUCTIONS:

The supervisor will complete this form when an employee reports an injury, but did not lose time and did not see a doctor.

This form can be used to help complete the 3067 if an employee eventually loses time or decides to see a doctor for this injury.

The Supervisor will retain this form for a minimum of five years (this form may be attached to the 3067 if one is completed).

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**APPENDIX 9
DIVING WITH NITROX FORM**

Please submit this form with a copy of your Nitrox certification(s).

I certify that I have read the Diving Safety Program NITROX guidelines, and that I agree to abide by them. I understand that there are potential risks associated with the use of NITROX that may be greater than those of normal air.

Name: _____

Signature: _____

Date of NITROX Certification: _____

Certifying Agency: _____

Date: _____ DSB Certification Check: _____ EAN>40: _____

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**APPENDIX 11
INFORMATION FOR SCUBA DIVER APPLICANTS**

This packet contains the following information and forms:

1. SCUBA APPLICATION FORM – Fill out this form completely, using extra pages if necessary. When submitting, be sure you have had your Supervisor and Manager (Administrator, Division Chief, or Regional Manager) sign the bottom of the form. Include a legible copy of the following certifications:

Your basic Open Water scuba certification from a recognized organization, and any other advanced or specialty cards

A Rescue Diver course from a recognized Recreational Scuba Training Council (RSTC) organization

First Aid and CPR (CPR must have been within the last two years)

An Emergency Oxygen Administration course (DAN or equivalent)

2. MEDICAL EVALUATION FORMS (Appendices 1-3) – This includes a Medical History to be completed by the applicant and a Fitness for Diving Report to be completed by a physician after a physical examination. The examination must have been within 24 months of the scheduled DFG Diver Certification Course. The form should be returned directly to the applicant for inclusion in the completed application package.

3. SCUBA DIVER CHECKLIST FOR CERTIFICATION – This form lists the testing requirements to become a Department scuba diver. Note that the Swimming Evaluation (DSM, Section 4.32.3) must be completed and verified prior to the certification course. If these skills are not performed satisfactorily and completely, applicants shall not be allowed to attend the certification course. An applicant should fill in the personal information on this form and bring it with him/her to the evaluation test site. Tests may be verified by members of the Diving Safety Board, their designees, or project supervisors. Be sure that every requirement is signed off.

4. DEPARTMENT OF FISH AND GAME *DIVING SAFETY MANUAL* – This document contains the operational mandates and auspices for all scuba activities. Applicants need to be thoroughly familiar with its provisions and equipment requirements prior to attending the certification course.

5. LIST OF REQUIRED SCUBA EQUIPMENT – This is contained in Section 3.00 of the Diving Safety Manual and summarized below. All required equipment listed is mandatory for the certification course. Subject to your supervisor's approval, these items may be purchased or rented at Department expense. Any borrowed scuba equipment must comply with Department inspection and servicing guidelines as specified in the DFG Diving Safety Manual. Note: Regardless if a weight integrated BCD is to be utilized during the certification, applicants will still need to be competent with and provide a separate weight belt for the course.

Completed packages should be submitted to the Diving Safety Officer at least two weeks prior to the scheduled certification course. Submittal of the package does not guarantee a placement in the course. Openings are limited and filled on a first come, first served basis.

Candidates should submit completed packages directly to:

Department of Fish and Game
Diving Safety Program
3201 S Street
Sacramento, CA 95816

When your forms have been reviewed and approved, you should start on the Department Scuba Diving Examination. The examination is an extensive open book, research test requiring use of the DFG Diving Safety Manual and the NOAA Scuba Diving Manual as reference materials. Recreational scuba organization texts may provide good background material, but due to a wide range of standards, practices, and tables, base your answers on the texts listed. When completed, the entire examination should be copied. You must submit the exam to the Diving Safety Officer for correction as part of your application package at least two weeks before the certification course. Bring your copy to the certification course for group review and discussion. Since this is open book, applicants must receive a score of 90 percent to pass this phase of the certification process.

If you, or your supervisor, have any questions regarding the Certification Course schedules or content, completion of your package, equipment or skill requirements, please give me a call. I'm on the road with classes quite a bit, so consider giving me a little lead-time to get back to you. Members of the Diving Safety Board are also available to help you. Good luck with the DFG Scuba Diving Certification process.

DEPARTMENT OF FISH AND GAME
DIVING SAFETY PROGRAM

APPLICATION FOR SCUBA DIVER CERTIFICATION

Personal Data:

Name _____ Date of Birth _____ Age _____

Title _____ Branch/Division _____ Region _____

Work Address _____

E-Mail _____ Work Phone _____

Emergency Contact(s) _____ Relationship _____ Phone _____

Diving Certifications: (Use back of sheet for additional information.)

Course	Title	Agency	Date Completed	Hours

Experience:

Swimming _____ hours Boat Operation _____ hours Skin Diving _____ hours

Freshwater Scuba _____ hours Ocean Scuba _____ hours Com/Mil Diving _____ hours

Boat Diving _____ hours Surface Supplied _____ hours # of Surf Entries & Exits _____

Please list your last 12 scuba dives:

	Date	Location	Depth/Time	Activity
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Approvals: Supervisor _____

Reg. Mgr. / Br. Chief _____

DEPARTMENT OF FISH AND GAME
DIVING SAFETY PROGRAM

SCUBA DIVER EVALUATION CHECKLIST (Revised August 2004)

Swimmer Name: _____ Date: _____

1. 400 Yard Swim Completed: Yes No Time: _____

(Standard: Swimmer shall complete this test in less than 12 minutes without the use of fins or floatation device and without touching the bottom)

2. 25 Yard Underwater Swim Completed: Yes No

(Standard: Swimmer shall complete this test in one breath without the use of fins and without touching the bottom)

3. Weight Recovery Completed: Yes No

(Standard: Swimmer shall pick up a 15 pound weight from a depth of 15 feet, carry it to the surface, and hand it off while holding breath without the use of fins)

4. 25 Yard Swimmer Assist Completed: Yes No

(Standard: Swimmer shall transport another person of equal size on the surface without the use of swim aids and without touching the bottom)

5. Survival Swim Completed: Yes No

(Standard: Swimmer shall maintain surface buoyancy continuously for 10 minutes without the use of fins or floatation device and without touching bottom)

Certification by supervisor or Diving Safety Board Member:

I certify that I witnessed the named swimmer complete or not complete these tests according to the standards listed.

Name: _____ Title: _____

Signature: _____

**DEPARTMENT OF FISH AND GAME
DIVING SAFETY PROGRAM**

Required Equipment for Diver Certification Course

Mask (With Nose Pocket)

Fins

Snorkel

Wetsuit (With Boots & Gloves, Appropriate for Water Conditions)

Weight Belt (Full Ballast with Quick Release)

Regulator (Balanced First Stage, Single Hose Second Stage)

Alternate Air Source (Octopus, Air 2, Redundant)

Submersible Cylinder Pressure Gauge

Air Cylinders (Two; Either Steel or Aluminum +/- 80cf)

Buoyancy Control System

Cylinder Backpack (If not integral with BCS above)

Depth Gauge

Diving Watch / Timer

Submersible Compass

Knife / Cutting Tool

Diving Tables (US Navy No Decompression Limit)

Diving Light

Whistle

Underwater Slate

Note: This is a list of minimum required equipment. You may bring more but storage on boats and/or diving facilities is limited. If you utilize a Buoyancy Control System with integrated weight capability you will still need to bring a separate weight belt and weights. Cylinders may be available at the training site.

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APPENDIX 12 VOLUNTEER DIVER CERTIFICATION PROCEDURE

Overview

A main objective of the DFG Volunteer Program is to ensure that volunteer services contribute to the goals of the Department while complying with state and federal requirements for safety in the workplace. The *DIVING SAFETY MANUAL* (DSM) sets the standards and policies to ensure that all diving by Department employees and volunteers is conducted safely and in accordance with those requirements.

This Appendix outlines the process for recruiting and certifying Department volunteers as Department Divers. These guidelines should be followed by the Department Project Lead or Volunteer Coordinator in conjunction with the Department *Volunteer Coordinator's Handbook* (VCH).

ALL Department Volunteers

The following items are produced or occur for all volunteers:

I. Identify need

- A. Identify specific field tasks appropriate for in scope and duration for volunteers
- B. Obtain approval from project supervisor

II. Recruit volunteers

- A. Create a job description/ duty statement
- B. Advertise opportunity, host informational meetings and/or interviews (See VCH, and Department Operations Manual and for more information.)

III. Volunteer orientation

- A. Volunteers must sign Oath of Allegiance, Volunteer Service Agreement (VSA) and other forms as applicable. (Forms are found in VCH.) On VSA, if medical condition is checked, the Volunteer must fill out Health Questionnaire (STD 610).
- B. Review DFG and applicable regional Mission Statements.
- C. Review the Job Description (see VCH): duties, conditions, responsibilities, supervisory chain of command, performance standards, job title, equipment provided, required training, and time commitment. Obtain volunteer signature and provide a copy to volunteer; keep signed copy on file. Form must be updated as duties change.
- D. Ask volunteer about health or physical limitations that may affect job performance. (See VCH.)
- E. Job Safety Analysis (JSA) form (see VCH): Complete JSA prior to meeting with volunteer; review JSA with volunteers (do they understand everything; are they comfortable with conditions outlined in the JSA; adjust tasks and responsibilities as necessary). Obtain approval signature from volunteer and supervisor. Submit to Office of Safety and Health; keep copy on file. A separate JSA must be completed for each project (activity) or certification
- F. Introduce volunteer to supervisor, office personnel and other volunteers
- G. Familiarize volunteer with work area and equipment (office or field location)
- H. Review performance standards and mechanism for performance review and

feedback

- I. Provide the following:
 1. "Volunteerism and Mission of the DFG Volunteer Program;" pages ONE-1 to ONE-2 of the VCH
 2. VCH, if requested
 3. "State Employees Guide to Workers' Compensation," if requested

IV. Volunteer program feedback and incentives

- A. Provide positive feedback and rewards, and educational enrichment opportunities
- B. DFG Activity Program Report: complete this form in January of each year
- C. Review each VSA once a year

Volunteer Divers

In addition to the above, Department volunteers wishing to become Department certified divers must successfully complete the Scientific Diver Certification (DSM Section 5.00). A provision for temporary certification (Restricted Certification) exists and is also contingent on completion of the full certification program:

I. Department Scientific Diver Certification (DSM Section 5.21)

- A. Volunteer diver candidates must submit a complete application package with required signatures to the Diving Safety Officer (DSO). See DSM Appendix 11, Information for Scuba Diver Applicants. Materials include:
 - Scuba Application Form
 - Medical Evaluation Forms
 - Review of Scuba Diver Checklist for Certification
 - Review and understanding of Department of Fish and Game DSM policies and procedures
 - Documentation of successful completion of Swim Test
 - Review of Required Scuba Equipment List
 - Completed Department Scuba Diving Examination
- B. If accepted, the candidate may attend the Scientific Diver Certification Course (Section 5.32).
- C. After successful completion of the certification course, Volunteer Divers may participate in any DFG diving project. Volunteer Divers will be required to fulfill Department requirements for Maintenance of Certification (Section 5.70), including submission of monthly dive logs, reporting of any accidents or incidents, and attendance at an annual diver recertification workshop.
- D. Prior to each working dive, volunteer divers shall be briefed on tasks to be completed, operational conditions, and anticipated field conditions of the diving project. Briefing materials include Job Descriptions, Job Safety Analysis Forms, and discussions with the Project Lead or designee. If needed, volunteers must undergo additional training or orientations to perform job safely.

II. Restricted Certification (Temporary Diver Permit) (DSM Section 5.22)

- A. Volunteer diver candidate must submit a complete application package with required signatures to the DSO (including Department Scuba Diving Examination), and be familiar with the policies and procedures of the DSM (see I A, above).
- B. In addition, the candidate for Restricted Certification must provide a written statement from a responsible person documenting the candidate's training, qualifications, and experience in a diver training program equivalent to the Department's diving program (i.e., university, commercial diving, military, or other scientific organization).
- C. Once application materials are reviewed and accepted, the candidate for Restricted Diver certification shall be evaluated to the standards of the general certification course (Section 5.32).
- D. Upon the candidate's successful completion of the evaluation, the DSB will recommend and the DSO may certify, that the candidate receive a Restricted Certification. **As a condition of Restricted Certification, the restricted diver shall attend the next regularly scheduled Department certification course.**
- E. Dives conducted by Restricted Certified divers shall be limited to those previously approved by the DSO and shall comply with all other policies, regulations, and standards of this manual, including medical, and routine reporting requirements.

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APPENDIX 13 SELECTED REFERENCES

Diving Protocol and Standards

- American Academy of Underwater Sciences. 2003. *Standards for Scientific Diving*. American Academy of Underwater Sciences: Nahant, Massachusetts. 59 pp.
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- Joiner, J.T., ed. 2001. *NOAA Diving Manual* (4th Ed.). Best Publishing Company: Flagstaff, Arizona. 700 pp.
- National Association of Underwater Instructors. 2004. *NAUI Advanced Scuba Diver*. NAUI Better Business Forms Printing Solutions: Tampa, Florida. 181 pp.
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- National Association of Underwater Instructors. 2004. *NAUI Scuba Diver*. NAUI Better Business Forms Printing Solutions: Tampa, Florida. 234 pp.
- Professional Association of Diving Instructors. 2003. *The Encyclopedia of Recreational Diving* (2nd Ed.). PADI: Santa Ana, California. 303 pp.
- U.S. Department of the Navy. 1999. *U.S. Navy Diving Manual, Revision 4*. NAVSEA 0910-LP-708-8000. Naval Sea Systems Command: Arlington, Virginia.
- American Academy of Underwater Sciences. www.aaus.org
Policies and standards of practice for the scientific diving community
- NOAA Dive Program. www.ndc.noaa.gov
Administration and operations information for the National Oceanic and Atmospheric Administration diving program
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Comprehensive medical information on diving and undersea medicine for non-medical divers, non-diving physicians and specialists
- European Underwater and Baromedical Society. www.eubs.org
Society dedicated to the study and promotion of diving and hyperbaric medicine
- Int'l Congress on Hyperbaric Medicine. www.ichm.net
Organization to promote and improve understanding among the international hyperbaric medicine community
- South Pacific Underwater Medicine Society. www.spums.org.au
Organization to promote research and education on underwater and hyperbaric medicine
- Undersea Hyperbaric Medical Society. www.uhms.org
Organization that provides scientific information to protect the health of sport, military and commercial divers

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National service providing undersea scientists with tools and expertise

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Organization that investigates and records diving history

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