Walla Walla University

STANDARDS FOR SCIENTIFIC DIVING MANUAL

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FOREWORD
Since 1951 the scientific diving community has endeavored to promote safe, effective diving through self-imposed diver training and education programs. Over the years, manuals for diving safety have been circulated between organizations, revised and modified for local implementation, and have resulted in an enviable safety record.

This document is modified from the American Academy of Underwater Sciences (AAUS) Standards for Scientific Diving, 2018 revision, and represents the minimal safety standards for scientific diving at the present day. As diving science progresses so must this standard, and it is the responsibility of Walla Walla University as an Organizational Member of AAUS to see that it always reflects state of the art, safe diving practice.

AAUS Standards Revision History
Available at www.aaus.org/About/Diving Standards
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Volume 1

Sections 1.00 through 5.00
Required For All AAUS Organizational Members
Section 1.00 GENERAL POLICY

1.10 Scientific Diving Standards

Purpose

The purpose of these Scientific Diving Standards is to ensure scientific diving is conducted in a manner that will maximize the protection of scientific divers from accidental injury and/or illness, and to set forth standards for training and certification that will allow a working reciprocity between Organizational Members (OMs or OM). Fulfillment of these purposes shall be consistent with the furtherance of research and safety, and facilitation of collaborative opportunities between AAUS OMs.

This Walla Walla University Standards for Scientific Diving Manual includes and expands on the minimum standards for the establishment of American Academy of Underwater Sciences (AAUS) recognized scientific diving programs, the organization for the conduct of these programs, and the basic regulations and procedures for safety in scientific diving operations. It also establishes a framework for reciprocity between AAUS OMs that adhere to these minimum standards.

Historical Perspective

The AAUS Standards for Scientific Diving Manual (www.aaus.org/About/Diving Standards) was 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.

In 1982, OSHA exempted scientific diving from commercial diving regulations (29CFR1910, Subpart T) under certain conditions that are outlined below. The final guidelines for the exemption became effective in 1985 (Federal Register, Vol. 50, No.6, p.1046). AAUS is recognized by OSHA as the scientific diving standard setting organization.

Washington State Administrative Code (WAC) Chapter 296-37 describes the standards for commercial diving operations. Appendix B to WAC Chapter 296-37 lists the guidelines for scientific diving. It is the intent of this Walla Walla University Standards for Scientific Diving Manual to meet or exceed all relevant Federal and State Standards.

Additional standards that extend this document have been adopted by Walla Walla University, according to local procedure. Copies of these Scientific Diving Standards must be available to all personnel covered by its scope.

Scientific Diving Definition

Scientific diving is defined (OSHA 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. Scientific diving does not include performing any tasks usually associated with commercial diving such as: Placing or removing heavy objects underwater; inspection of pipelines and similar objects; construction; demolition; cutting or welding; or the use of explosives.”
Scientific Diving Exemption

The two elements that a diving program must contain as defined by OSHA in 29 CFR 1910 Subpart T 1910.401(a)(2)(iv) are:

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

b) Diving control (safety) board, with the majority of its members being active divers, which must 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.

OSHA has granted an exemption for scientific diving from commercial diving regulations under the following guidelines (Appendix B to 29 CFR 1910 Subpart T):

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

Recommendations for Changes to this Manual

As part of Walla Walla University’s annual report, any recommendations for modifications of this Manual shall be submitted to AAUS for consideration.

1.20 Operational Control

Walla Walla University Auspices and Responsibilities

Walla Walla University auspices include any scientific diving operation in which Walla Walla University is connected because of ownership of life support equipment used, locations selected, or relationship with the individual(s) concerned. This includes all cases involving the operations of authorized individuals of Walla Walla University or auxiliary organizations, where such individuals are acting within the scope of their authorization.

It is Walla Walla University’s responsibility to adhere to the AAUS Standards for Scientific Diving Certification and Operation of Scientific Diving Programs. The administration of the local diving program will reside with the Walla Walla University Diving Control Board (DCB).

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

Walla Walla University Standards for Scientific Diving Manual

Meeting AAUS minimum standards is a requirement for organizational membership in the Academy. Walla Walla University has developed and maintained a Manual that includes wording on how Walla Walla University defines specific policies and procedures required for the proper function of a scientific diving program. This Manual addresses environmental and working conditions unique to the program’s operations. This Manual meets or exceeds the AAUS standards.
AAUS standards are the foundation for the development of the *Walla Walla University Standards for Scientific Diving Manual*. Deviations or significant changes to AAUS minimum standards may require justification before approval is granted by the AAUS Standards Committee.

**Diving Control Board**

- The Diving Control Board (DCB) must consist of a majority of active scientific divers. Voting members include the Associate Vice President for Academic Administration, the Director of Risk and Safety Management, the Diving Safety Officer (DSO), and other active scientific divers of the University community. Other non-voting representatives may be appointed or invited as needed. A chairperson and a secretary may be chosen from the membership of the board according to local procedure.
- Has autonomous and absolute authority over the scientific diving program’s operation.
- The DCB must:
  - Establish additional standards, protocols, and operational procedures beyond the AAUS minimums to address Walla Walla University’s specific needs and concerns.
  - Approve and monitor diving projects.
  - Review and revise this *Manual*.
  - Ensure compliance with this *Manual*.
  - Approve the depth to which a diver has been authorized to dive.
  - Take disciplinary action for unsafe practices.
  - Ensure adherence to the buddy system for scientific diving.
  - Act as the official representative of Walla Walla University 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 authorizations.
  - Recommend changes in policy and amendments to AAUS and this *Manual* as the need arises.
  - Establish and/or approve training protocols or standards through which the applicants for authorization can satisfy the requirements of this *Manual*.
  - Suspend diving operations 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 Walla Walla University’s air station(s) meet air quality standards as described in Section 3.60.
  - Periodically review the DSO’s performance and program.
  - Investigate diving incidents within the Walla Walla University scientific diving program or violations of this *Manual*.
- The DCB may delegate operational oversight for portions of the program to the DSO; however, the DCB may not abdicate responsibility for the safe conduct of the diving program.
Diving Safety Officer

The Diving Safety Officer (DSO) serves as a voting member of the DCB, and should be designated one of the Walla Walla University’s Representatives to AAUS. This person should have broad technical expertise and experience in research related diving.

Qualifications:

1. Must be an active scuba instructor from an internationally recognized certifying agency.
2. Must be appointed by the responsible administrative officer or designee, with the advice and counsel of the DCB.
3. Must qualify as a Full Voting Member of AAUS as defined by AAUS Bylaws:
   “(a) Holds a diving certification from a recognized national certifying agency or equivalent, and
   (b) Has engaged in sustained or successive scientific diving activities during the past two years, or
   (c) Has completed a course in scientific diving that meets the requirements as specified by the most current edition of the AAUS Standards for Scientific Diving.”
4. Must attend an AAUS DSO Orientation within one year of accepting a position at an AAUS approved OM, unless he/she has served as a DSO for another current AAUS OM within the last year.

Duties and Responsibilities

1. Answers, through the DCB, to the appropriate administrative officer or designee, for the conduct of the scientific diving program of Walla Walla University.
2. If delegated by the DCB, the routine operational authority for this program rests with the DSO. This oversight includes, but is not limited to: training, diver authorizations, approval of dive plans, maintenance of diving records, and ensuring compliance with this Manual.
3. May permit some duties and responsibilities to be carried out by a qualified delegate, with the approval of the DCB.
4. Must be guided in the performance of the required duties by the advice of the DCB, but operational responsibility for the conduct of the scientific diving program will be retained by the DSO.
5. Must suspend diving operations determined to be unsafe or unwise.

Instructional Personnel Qualifications

All personnel involved in diving instruction under the auspices of Walla Walla University must be reviewed and authorized by the DCB.

Lead Diver

For each dive, one individual shall be designated as the Lead Diver who shall be at the dive location during the diving operation. The Lead Diver shall be responsible for:

- Ensuring dives are conducted in accordance with Section 2.0.
- Ensuring all dive team members possess current authorization and are qualified for the type
of diving operation.
- Coordination with other known activities in the vicinity that are likely to interfere with diving operations.
- Ensuring safety and emergency equipment is in working order and at the dive site.
- Suspending diving operations if in their opinion conditions are not safe.
- Reporting to the DCB, through the DSO, any physical problems or adverse physiological effects including symptoms of pressure-related injuries.

Reciprocity and Visiting Scientific Diver
- Two or more AAUS OMs engaged jointly in diving activities, or engaged jointly in the use of diving resources, must designate one of the participating DCBs to govern the joint dive project. However, responsibility for individual divers ultimately resides with the home OM.
- A Scientific Diver from one OM must apply for permission to dive under the auspices of another OM by submitting to the DSO of the host OM a document containing all the information listed in Appendix 6, signed by the DSO or designee of the home DCB.
- A visiting Scientific Diver may be asked to demonstrate their knowledge and skills for the planned dive.
- If a host OM denies a visiting Scientific Diver permission to dive, the host DCB must notify the visiting Scientific Diver and their DCB with an explanation of all reasons for the denial.

Waiver of Requirements
The Walla Walla University DCB may grant a waiver for specific requirements of training, examinations, depth authorizations, and minimum activity to maintain authorizations. AAUS medical standards may not be waived.

1.30 Consequence of Violation of Regulations by Scientific Divers
Failure to comply with the regulations of this Manual may be cause for the restriction or revocation of the diver’s scientific diving authorization by action of the DCB.

1.40 Consequences of Violation of Regulations by Organizational Members
Failure to comply with the regulations of this Manual may be cause for the restriction or revocation of Walla Walla University’s recognition by AAUS.

1.50 Record Maintenance
Walla Walla University must maintain consistent records for its diving program and for each participant. These records include but are not limited to: this Manual; equipment inspection, testing, and maintenance records; dive plans (project and/or individual); records of dive (project and/or individual); medical approval to dive; diver training records; diver authorization(s); individual dive log; dive incident reports; reports of disciplinary actions by the DCB; and other pertinent information deemed necessary by Walla Walla University.

Availability of Records:
- Medical records must be available to an attending physician of a diver or former diver when released in writing by the diver.
- Records and documents required by this Manual must be retained by Walla Walla University for the following period:
  2. Equipment inspection, testing, and maintenance records – Minimum current entry or
tag.
3. Records of Dive – minimum of 1 year, except 5 years where there has been an incident of pressure-related injury.
4. Medical approval to dive – Minimum of 1 year past the expiration of the current document except 5 years where there has been an incident of pressure-related injury.
5. Diver training records – Minimum of 1 year beyond the life of the diver’s program participation.
6. Diver authorization(s) – Minimum of 1 year beyond the life of the diver’s program participation.
7. Pressure-related injury assessment - 5 years.
8. Reports of disciplinary actions by the DCB – Minimum of 1 year beyond the life of the diver’s program participation.
SECTION 2.00 DIVING REGULATIONS

2.10 Introduction

No person shall engage in scientific diving operations under the auspices of Walla Walla University’s scientific diving program unless they are authorized pursuant to the provisions of this Manual.

2.20 Pre-Dive Procedures

Dive Plans

Before conducting any diving operations under the auspices of Walla Walla University, a dive plan for the proposed project or dive must be formulated and submitted for approval by the DCB or designee. Dives should be planned around the competency of the least experienced diver. The dive plan (project or individual) should include the following:

- Diving Mode(s) and Gas(es)
- Divers’ authorizations
- 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
- Emergency Action Plan (Appendix 7)

In water details of the dive plan should include:

- Dive Buddy assignments and tasks
- Goals and objectives
- Maximum depth(s) and bottom time
- Gas management plan
- Entry, exit, descent and ascent procedures
- Perceived environmental and operational hazards and mitigations
- Emergency and diver recall procedures

Diver Responsibility and Refusal to Dive

The decision to dive is that of the diver. The ultimate responsibility for safety rests with the individual diver. It is the diver’s responsibility and duty to refuse to dive, without fear of penalty, if in his/her judgment, conditions are unsafe or unfavorable, or if he/she would be violating the precepts of regulations in this Manual.

No dive team member will be required to be exposed to hyperbaric conditions against his/her will.

No dive team member may dive for the duration of any known condition, which is likely to adversely affect the safety and health of the diver or other dive team members.
Pre-dive Safety Checks

- Prior to commencing the dive, the team must assure that every team member is healthy, fit, and trained for the type of dive that is being attempted.
- Scientific divers must conduct a functional check of their diving equipment in the presence of the dive buddy or tender. They must ensure the equipment is functioning properly and suitable for the type of diving operation being conducted.
- Each diver must have the capability of achieving and maintaining positive buoyancy at the surface.
- Environmental conditions at the site will be evaluated prior to entering the water.

Pre-dive Briefings

Before conducting any diving operations under the auspices of Walla Walla University, the dive team members must be briefed on:
- Dive Buddy assignments and tasks
- Dive objectives.
- Maximum depth(s) and bottom time
- Turn around pressure and required surfacing pressure
- Entry, exit, descent and ascent procedures
- Perceived environmental and operational hazards and mitigations
- Emergency and diver recall procedures

2.30 Diving Procedures

Solo Diving Prohibition

All diving activities must assure adherence to the buddy system. This buddy system is based upon mutual assistance, especially in the case of an emergency.

Dives Conducted from Vessels

All dives originating from a vessel must include a dedicated vessel operator. The vessel operator shall be a responsible and capable adult (18 years of age or older), preferably with scuba experience. The vessel is to remain near the divers’ surface-exhaust bubbles and is to display a dive flag. Vessels will meet United States Coast Guard requirements for the size and type of vessel being used.

Decompression Management

- On any given dive, both divers in the buddy pair must follow the most conservative dive profile
- A safety stop performed during the ascent phase of the dive should be conducted on any dive that exceeds 30 feet (9.14m).

Termination of the Dive

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

It is the responsibility of the diver to terminate the dive that he/she considers unsafe, without fear of reprisal, in a way that does not compromise the safety of another diver already in the water.
Emergencies and Deviations from Regulations
Any diver may deviate from the requirements of this Manual to the extent necessary to prevent or minimize a situation likely to cause death, serious physical harm, or major environmental damage. A written report must be submitted to the DCB explaining the circumstances and justifications.

2.40 Post-Dive Procedures

Post-Dive Safety Checks
After the completion of a dive, each diver must report any physical problems, symptoms of decompression sickness, or equipment malfunctions to the Lead Diver, DSO, and/or DCB.

2.50 Emergency Procedures
Walla Walla University will develop emergency procedures for each dive location which follow the standards of care of the community and must include procedures and implementation criteria for emergency care, recompression, evacuation, and incident reporting.

2.60 Flying After Diving or Ascending to Altitude (Over 1000 feet/304 meters)
- Following a Single No-Decompression Dive: Divers should have a minimum preflight surface interval of 12 hours.
- Following Multiple Dives per Day or Multiple Days of Diving: Divers should have a minimum preflight surface interval of 18 hours.
- Following Dives Requiring Decompression Stops: Divers should have a minimum preflight surface interval of 24 hours.
- Before Ascending to Altitude Above 1000 feet (304 meters): Divers should follow the appropriate guideline for preflight surface intervals unless the decompression procedure used has accounted for the increase in elevation.

2.70 Record Keeping Requirements

Personal Diving Log
Each authorized scientific diver must log every dive made under the auspices of Walla Walla University’s program and is encouraged to log all other dives. Dive log format will be provided by the DSO. Logs must be submitted and will remain in the divers’ file. The dive log must include at least the following:
- Name of diver and buddy
- Date, time, and location
- Diving modes used
- General nature of diving activities
- Maximum depth and dive time
- Diving tables or computers used
- Detailed report of any near or actual incidents
Required Incident Reporting

All diving incidents requiring recompression treatment, or resulting in moderate or serious injury, or death must be reported to the DCB and AAUS in a timely manner. Walla Walla University’s regular procedures for incident reporting incidents, injuries, and illnesses, including those required by AAUS, will be followed. Walla Walla University will investigate and document any incident of pressure-related injury and prepare a report that is to be forwarded to AAUS during the annual reporting cycle.

- If pressure-related injuries are suspected, or if symptoms are evident, the following additional information must be recorded and retained by Walla Walla University, with the record of the dive, for a period of 5 years:
  - 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.
    - The circumstances of the incident and the extent of any injuries or illnesses.
    - Description of symptoms, including depth and time of onset.
    - Description and results of treatment.
    - Disposition of case.
    - Recommendations to avoid repetition of incident.

In addition to requirements specific to Walla Walla University, all diving incidents will be reported to AAUS. This report must first be reviewed and released by the DCB and at a minimum contain:

- Complete AAUS Incident Report.
- Summary of experience of divers involved.
- Description of dive site, and description of conditions that led up to incident.
- The circumstances of the incident and the extent of any injuries or illnesses.
- Description of symptoms, including depth and time of onset.
- Description and results of treatment.
- Disposition of case.
- Recommendations to avoid repetition of incident.
SECTION 3.00 DIVING EQUIPMENT

3.10 General Policy
All equipment must meet standards as determined by the DSO and the DCB. All equipment must be regularly examined by the person using it and serviced according to manufacturer recommendations. Equipment that is subjected to extreme usage under adverse conditions should require more frequent testing and maintenance. The use of diving equipment other than open circuit SCUBA shall require written permission from the DCB.

3.20 Equipment
The DCB must establish the minimum equipment configuration for all dives.

Regulators and Gauges
- Scuba regulators and gauges must be inspected and tested prior to each use and serviced, at a minimum, according to manufacturer’s recommendations
- Standard open circuit (OC) regulator configuration is:
  - A first stage
  - Primary 2nd stage
  - Back up 2nd stage
  - Submersible Pressure Gauge (SPG)
  - Inflator hose for a Buoyancy Compensator Device
- A Full Face Mask (FFM) may be used in place of the primary 2nd stage according to manufacturer’s recommendations. Documentation of successful FFM training and written permission from the DCB is required.

Equipment for Determination of Decompression Status
- Each member of the buddy team must have an underwater timing device and depth indicator, or dive computer. Divers using dive computers must demonstrate proficiency on the correct use of the specific unit being used to the DSO or DCB scientific diver member.
- If dive tables are being used a set must be available at the dive location.
- If a dive computer is used the diver must use the same computer on repetitive dives.
- In an aquarium or other manmade structure of a known maximum obtainable depth:
  - A depth indicator is not required, except when a diver’s decompression status must be taken into consideration on repetitive dives.
  - Only one buddy must be equipped with a timing device.
  - The maximum obtainable depth of the aquarium must be used as the diving depth.

Scuba Cylinders
- Scuba cylinders must be designed, constructed, and maintained in accordance with the applicable provisions of the Unfired Pressure Vessel Safety Orders.
- Scuba cylinders must be hydrostatically tested in accordance with DOT standards.
- Scuba cylinders must have an internal and external inspection at intervals not to exceed 12 months.
- Scuba cylinder valves must be functionally tested at intervals not to exceed 12 months.

Buoyancy Compensation Devices (BCD)
- Each diver must have the capability of achieving and maintaining neutral buoyancy underwater and positive buoyancy at the surface.
- BCDs, dry suits, or other variable volume buoyancy compensation devices must be equipped with an exhaust valve.
- These devices must be functionally inspected and tested at intervals not to exceed 12 months.
- BCDs, dry suits, or other variable volume buoyancy compensation devices must not be used as a lifting device in lieu of lift bags.

**Lights**
- For night dives each diver must have a primary light, a secondary (backup) light, and a tank/snorkel light

**Cutting Device**
- Each diver must be equipped with a diver’s knife or shears.

**Signaling Devices**
- Each diver must be equipped with a surface marker buoy.
- Each diver must be equipped with a surface auditory signaling device such as a whistle or scuba air horn.

### 3.30 Auxiliary Equipment

**Handheld Underwater Power Tools**
- The use of surface-supplied electrical, pneumatic, and hydraulic hand held tools must be approved in writing by the DCB. Some tools and tool use may not be appropriate for scientific divers under the OSHA exemption for scientific diving.
- Power tools and equipment used underwater must be specifically approved for this purpose.
- Tools and equipment supplied with power from the surface must be de-energized before being placed into or retrieved from the water.
- Handheld power tools must not be supplied with power from the dive location until requested by the diver.

### 3.40 Support Equipment

**First Aid Supplies**
- A first aid kit and emergency oxygen appropriate for the diving being conducted must be available at the dive site.

**Diver’s Flag**
- A diver’s flag must be displayed prominently whenever diving is conducted under circumstances where required or where water traffic is probable.

**Emergency Communication**
- A cell/mobile phone and a VHF radio must be present at all dive locations.
Compressor Systems - Organizational Member Controlled

Walla Walla University currently does not own, operate, or control a compressor system. If in the future the university owns, operates, or controls a compressor system the following standards will be followed.

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

- Low-pressure compressors used to supply air to the diver if equipped with a volume tank must have a check valve on the inlet side, a relief valve, and a drain valve.
- Compressed air systems over 500 psig must have slow-opening shut-off valves.
- All air compressor intakes must be located away from areas containing exhaust or other contaminants.

3.50 Equipment Maintenance

Record Keeping

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

- Regulators
- Gauges (SPG, Depth Gauges, Timers, and Dive Computers)
- BCDs
- Dry suits
- Scuba cylinders and valves
- Full Face Masks
- Compressors, air filtration systems, gas control panels, and storage banks
- Surface supplied equipment
- Rebreather systems
- Additional equipment categories as determined by the DCB

Compressor Operation and Air Test Records

Walla Walla University currently does not own, operate, or control a compressor system. If in the future the university owns, operates, or controls a compressor system the following standards will be followed.

Gas analyses and air tests must be performed on each OM-controlled breathing air compressor at regular intervals of no more than 100 hours of operation or 6 months, whichever occurs first. The results of these tests must be entered in a formal log and be maintained.
3.60 Air Quality Standards

Breathing Gas

Breathing gas must meet the following specifications as set forth by the Compressed Gas Association (CGA Pamphlet G-7.1; see table below).

<table>
<thead>
<tr>
<th>CGA Grade E</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
<td>Maximum</td>
</tr>
<tr>
<td>Oxygen</td>
<td>20 - 22%/(v)</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>10 PPM/(v)</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>1000 PPM/(v)</td>
</tr>
<tr>
<td>Condensed Hydrocarbons</td>
<td>5 mg/m(^3)</td>
</tr>
<tr>
<td>Total Hydrocarbons as Methane</td>
<td>25 PPM/(v)</td>
</tr>
<tr>
<td>Water Vapor ppm</td>
<td>(2)</td>
</tr>
<tr>
<td>Objectionable Odors</td>
<td>None</td>
</tr>
</tbody>
</table>

For breathing air used in conjunction with self-contained breathing apparatus in extreme cold where moisture can condense and freeze, causing the breathing apparatus to malfunction, a dew point not to exceed -50°F (63 pm v/v) or 10 degrees lower than the coldest temperature expected in the area is required.

Remote Operations

For remote site operations using gas sources not controlled by Walla Walla University, every effort should be made to verify breathing gas meets the requirements of this standard. If CGA Grade E gas is not verifiable, the DCB must develop a protocol to mitigate risk to the diver.
SECTION 4.00 SCIENTIFIC DIVER CERTIFICATION AND AUTHORIZATIONS

This section describes the training and performance standards for Walla Walla University Scientific Divers, which include and may exceed the training and performance standards for AAUS Scientific Divers. This section represents the minimum required level of knowledge and skills presented in a generalized format.

4.10 Prerequisites

Administrative

The candidate must complete all administrative and legal documentation required by this Manual.

Entry Level Diver Certification

Any scientific diving candidate diving under the auspices of Walla Walla University must, at minimum, show documented proof of Advanced Open Water Diver Certification or equivalent from an internationally recognized training agency. Other AAUS OMs who wish to train and certify entry level divers may do so under the standards of the most current version of the RSTC/WRSTC and/or ISO entry-level diver standards. Entry level diver training is a prerequisite to scientific diver training and therefore no part of entry level training may be counted in any way toward scientific diver training.

1 “Minimum Course Content for Open Water Diver Certification” - World Recreational Scuba Training Council (WRSTC), www.wrstc.com.


Medical Examination

The candidate must be medically qualified for diving as described in Section 5.0 and Appendices 1-4 of this Manual. AAUS medical standards may not be waived.

Swimming/Watermanship Evaluation

The candidate must demonstrate the following in the presence of the DSO or designee. All tests are to be performed without swim aids. However, where exposure protection is needed, the candidate must be appropriately weighted to provide for neutral buoyancy.

a) Swim underwater for a distance of 25 yards (23 meters) without surfacing.
b) Swim 400 yards (366 meters) in less than 12 minutes.
c) Tread water for 10 minutes, or 2 minutes without the use of hands.
d) Transport a passive person of equal size a distance of 25 yards (23 meters) in the water.
4.20 Training

The candidate must successfully complete prerequisites, theoretical aspects, practical training, and examinations for a minimum cumulative time of 100 hours and a minimum of 12 open water dives. Theoretical aspects must include principles and activities appropriate to the intended area of scientific study. Formats for meeting the 100 hour training requirement include formalized training courses, or a combination of formalized and on the job training.

When a diver’s resumè provides clear evidence of significant scientific diving experience, the diver can be given credit for meeting portions of the 100 hour course requirements. The DCB will identify specific overlap between on-the-job training, previous scientific diving training/experience and course requirements, and then determine how potential deficiencies will be resolved. However, Walla Walla University cannot “test-out” divers, regardless of experience, when they have no previous experience in scientific diving.

Any candidate who does not convince the DCB, through the DSO, that they possess the necessary judgment, under diving conditions, for the safety of the diver and his/her buddy, may be denied Walla Walla University scientific diving privileges.

<table>
<thead>
<tr>
<th>Theoretical Training / Knowledge Development</th>
<th>Required Topics:</th>
<th>Suggested Topics:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diving Emergency Care Training</strong></td>
<td>• Cardiopulmonary Resuscitation (CPR)</td>
<td><strong>Specific Dive Modes</strong> (methods of gas delivery)</td>
</tr>
<tr>
<td></td>
<td>• AED</td>
<td>• Open Circuit</td>
</tr>
<tr>
<td></td>
<td>• Standard or Basic First Aid</td>
<td>• Hookah</td>
</tr>
<tr>
<td></td>
<td>• Recognition of DCS and AGE</td>
<td>• Surface Supplied diving</td>
</tr>
<tr>
<td></td>
<td>• Accident Management</td>
<td>• Rebreathers (closed and/or semi-closed)</td>
</tr>
<tr>
<td></td>
<td>• Field Neurological Exam</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Oxygen Administration</td>
<td></td>
</tr>
<tr>
<td><strong>Dive Rescue</strong></td>
<td>• To include procedures relevant to OM specific protocols. (See water skills below)</td>
<td><strong>Specialized Breathing Gas</strong></td>
</tr>
<tr>
<td><strong>Scientific Method</strong></td>
<td></td>
<td>• Nitrox</td>
</tr>
<tr>
<td><strong>Data Gathering Techniques</strong> (Only items specific to area of study required)</td>
<td></td>
<td>• Mixed Gas</td>
</tr>
<tr>
<td>• Transects and Quadrats</td>
<td></td>
<td><strong>Specialized Environments and Conditions</strong></td>
</tr>
<tr>
<td>• Mapping</td>
<td></td>
<td>• Blue Water Diving</td>
</tr>
<tr>
<td>• Coring</td>
<td></td>
<td>• Altitude</td>
</tr>
<tr>
<td>• Photography</td>
<td></td>
<td>• Ice and Polar Diving (Cold Water Diving)</td>
</tr>
<tr>
<td>• Tagging</td>
<td></td>
<td>• Zero Visibility Diving</td>
</tr>
<tr>
<td>• Collecting</td>
<td></td>
<td>• Polluted Water Diving</td>
</tr>
<tr>
<td>• Animal Handling</td>
<td></td>
<td>• Saturation Diving</td>
</tr>
<tr>
<td>• Archaeology</td>
<td></td>
<td>• Decompression Diving</td>
</tr>
<tr>
<td>• Common Biota</td>
<td></td>
<td>• Overhead Environments</td>
</tr>
<tr>
<td>• Organism Identification</td>
<td></td>
<td>• Aquarium Diving</td>
</tr>
<tr>
<td>• Behavior</td>
<td></td>
<td>• Night Diving</td>
</tr>
<tr>
<td>• Ecology</td>
<td></td>
<td>• Kelp Diving</td>
</tr>
<tr>
<td>• Site Selection, Location, and Re-</td>
<td></td>
<td>• Strong Current Diving</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Potential Entanglement/Entrapment</td>
</tr>
<tr>
<td>Required Topics:</td>
<td>Suggested Topics:</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
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<td></td>
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<tr>
<td>Navigation</td>
<td>HazMat Training</td>
<td></td>
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<tr>
<td>HazMat Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• HP Cylinders</td>
<td>• Chemical Hygiene, Laboratory Safety</td>
<td></td>
</tr>
<tr>
<td>Decompression Management Tools</td>
<td>(Use of Chemicals)</td>
<td></td>
</tr>
<tr>
<td>• Dive Tables</td>
<td>Specialized Diving Equipment</td>
<td></td>
</tr>
<tr>
<td>• Dive Computers</td>
<td>• Full face mask</td>
<td></td>
</tr>
<tr>
<td>• PC Based Software</td>
<td>• Dry Suit</td>
<td></td>
</tr>
<tr>
<td>AAUS Scientific Diving Regulations and History</td>
<td>• Communications</td>
<td></td>
</tr>
<tr>
<td>• Scientific Dive Planning</td>
<td>• Dive Propulsion Vehicle (DPV)</td>
<td></td>
</tr>
<tr>
<td>• Coordination with other Agencies</td>
<td>• SMBs/Lift Bags</td>
<td></td>
</tr>
<tr>
<td>• Appropriate Governmental Regulations</td>
<td>• Line Reels</td>
<td></td>
</tr>
<tr>
<td>Hazards of breath-hold diving and ascents</td>
<td>Other Topics and Techniques as Determined by the DCB</td>
<td></td>
</tr>
<tr>
<td>Dive Physics (Beyond entry level scuba)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dive Physiology (Beyond entry level scuba)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dive Environments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decompression Theory and its Application</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Practical Training / Skill Development

#### Confined Water
At the completion of training, the trainee must satisfy the DSO or DCB-approved designee of their ability to perform the following, as a minimum, in a pool or in sheltered water:

- Enter water fully equipped for diving
- Clear fully flooded face mask
- Demonstrate air sharing and ascent using an alternate air source, as both donor and recipient, with and without a face mask
- Demonstrate buddy breathing as both donor and recipient, with and without a face mask
- Demonstrate understanding of underwater signs and signals
- Demonstrate ability to remove and replace equipment while submerged
- Demonstrate acceptable watermanship skills for anticipated scientific diving conditions

#### Open Water Skills
The trainee must satisfy the DSO, or DCB-approved designee, of their ability to perform at least the following in open water:

- Surface dive to a depth of 10 feet (3 meters) without scuba*
- Enter and exit water while wearing scuba gear* ^^
- Kick on the surface 400 yards (366 meters) while wearing scuba gear, but not breathing from the scuba unit*
- Demonstrate proficiency in air sharing ascent as both donor and receiver*
- Demonstrate 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*
- Underwater communications^^
- 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^
- Demonstrate judgment adequate for safe scientific diving* ^^

**Rescue Skills:**

- Rescue from depth and transport 25 yards (23 meters), as a diver, a passive simulated victim of an accident: surface diver, establish buoyancy, stabilize victim
- Demonstrate simulated in-water mouth-to-mouth resuscitation
- Removal of victim from water to shore or boat
- Stressed and panicked diver scenarios
- Recommendations For Rescue Of A Submerged Unresponsive Compressed-Gas Diver – Appendix 9

Successfully complete a minimum of one checkout dive and at least eleven additional open water dives in a variety of dive sites, for a cumulative surface to surface time of 6 hours. Dives following the checkout dive(s) may be supervised by an active Scientific Diver holding the necessary depth authorization experienced in the type of diving planned, and with the knowledge and permission of the DSO.

The eleven dives (minimum) following the initial checkout dive may be conducted over a variety of depth ranges as specified by the DCB. Depth progression must proceed shallower to deeper after acceptable skills and judgement have been demonstrated, and are not to exceed 100 feet (30 m) during the initial 12 dive cycle.

* Checkout dive element
^^ Evaluated on all dives
^ Evaluated at some point during the training cycle

### Examinations

<table>
<thead>
<tr>
<th>Examinations</th>
<th>The trainee will be subject to examination/review of:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equipment</strong></td>
<td>• Personal diving equipment&lt;br&gt;• Task specific equipment&lt;br&gt;• Function and manipulation of decompression computer to be employed by the diver (if applicable)</td>
</tr>
<tr>
<td><strong>Written Exams</strong></td>
<td>The trainee must pass a written examination reviewed and approved by the DCB that demonstrates knowledge of at least the following:&lt;br&gt;• Function, care, use, and maintenance of diving equipment&lt;br&gt;• Advanced physics and physiology of diving&lt;br&gt;• Diving regulations&lt;br&gt;• Applicable diving environments&lt;br&gt;• Emergency procedures for OM-specific dive mode(s) and environments, including buoyant ascent and ascent by air sharing&lt;br&gt;• Currently accepted decompression theory and procedures&lt;br&gt;• Proper use of dive tables&lt;br&gt;• Hazards of breath-hold diving and ascents</td>
</tr>
</tbody>
</table>
4.30 Diver Certification and Authorizations

Only a person diving under the auspices of Walla Walla University that subscribes to the practices of AAUS is eligible for a scientific diver certification.

**Diver-In-Training (DIT) Authorization**

This is an authorization to dive, usable only while it is current and for the purpose intended. This authorization signifies that a diver has completed and been certified as at least an Advanced Open Water Diver through an internationally recognized certifying agency and has the knowledge, skills, and experience necessary to commence and continue training as a scientific diver under supervision, as approved by the DCB. DIT status must only be used when the diver is on his/her way to becoming certified as a scientific diver. While it is recommended for DIT’s to have hands-on scientific diver experience during their training, the DIT status is intended to be a temporary authorization, not a substitute for Scientific Diver Certification.

**Scientific Diver Certification**

Signifies a diver has completed all requirements in Section 4.20 and is certified by Walla Walla University to engage in scientific diving without supervision, as approved by the DCB through the DSO. Submission of documents and participation in aptitude examinations does not automatically result in certification. To be certified, the applicant must demonstrate to the DCB, through the DSO, that s/he is sufficiently skilled and proficient, and possess the necessary judgement for their safety and/or that of the dive team. Scientific Diver Certification is only active when required authorizations are in place and current.

**Scientific Aquarium Diver Certification**

Scientific Aquarium Diver is a certification authorizing the diver to participate in scientific diving solely in the aquarium environment.

All requirements set forth for Scientific Diver certification must apply, except follows:

- Practical training must include at least 12 supervised aquarium dives for a cumulative bottom time of 6 hours.
- Training requirements for navigation and 400-yard (366-meter) surface swim in scuba gear may be waived at the discretion of the DCB.

**Temporary Diver Authorization**

Only a diver not under the auspices of an AAUS OM may be granted a Temporary Diver Authorization. The individual in question must demonstrate proficiency in diving and can contribute measurably to a planned dive. A Temporary Diver Authorization constitutes a waiver of selected requirements of Section 4.0 and is valid only for a limited time, as approved by the DCB. A Temporary Diver Authorization must be restricted to the planned diving operation and must comply with all other policies, regulations,
and standards of this *Manual*, including medical requirements. This authorization is not to be utilized as a repeated mechanism to circumvent existing standards set forth in this *Manual*.

### 4.40 Depth Authorizations

**Depth Ratings and Progression to Next Depth Level**

Indicates the maximum depth in which a diver can conduct science and may supervise other divers holding a lesser depth authorization. A scientific diver requires a valid depth authorization to be considered active.

A diver may be authorized to the next depth level after successfully completing the requirements for that level. A diver may exceed his/her depth authorization when accompanied and supervised by a dive buddy holding a depth authorization greater or equal to the intended depth. Dives must be planned and executed with the permission of the DCB or DSO.

In the event a diver does not hold an authorization at the desired next level, the DCB may authorize a required progression or procedure for a diver to attain a deeper authorization. If local conditions do not conform to traditional AAUS depth progressions, the DCB may devise a reasonable accommodation. However, the total number of dives to obtain a given depth authorization must follow the cumulative number of dives listed below.

- **a)** Authorization to 30 Foot Depth - Initial science diver depth authorization, approved upon the successful completion of training listed in Section 4.00. Cumulative minimum supervised dives: 12.
- **b)** Authorization to 60 Foot Depth - A diver holding a 30-foot authorization may be authorized to a depth of 60 feet after successfully completing and logging 12 supervised dives to depths between 31 and 60 feet under supervision of a diver authorized by the DCB, for a minimum total time of 4 hours. Cumulative minimum supervised dives: 24.
- **c)** Authorization to 100 Foot Depth - A diver holding a 60-foot authorization may be authorized to a depth of 100 feet after successfully completing and logging 6 supervised dives to depths between 61 and 100 feet under supervision of a dive buddy authorized by the DCB. The diver must also demonstrate proficiency in the use of the appropriate decompression profiling method. Cumulative minimum supervised dives: 30.
- **d)** Authorization to 130 Foot Depth - A diver holding a 100-foot authorization may be authorized to a depth of 130 feet after successfully completing and logging 6 supervised dives to depths between 100 and 130 feet under supervision of a dive buddy authorized by the DCB. The diver must also demonstrate proficiency in the use of the appropriate decompression profiling method. Cumulative minimum supervised dives: 36.

**Walla Walla University Scientific Diving is not permitted beyond a depth of 130 feet/40 meters**

### 4.50 Night Diving Certification

Night diving presents special opportunities and challenges for scientific divers. Upon the successful completion of training and certification listed in 4.10-4.40, scientific divers are certified for daytime diving (sunrise to sunset). To be certified for night diving (sunset to sunrise), scientific divers must perform the following with the knowledge and permission of the DSO:

- **a)** Plan and execute a minimum of one night dive in a shallow/sheltered water environment to a maximum depth of 40 feet. This dive must be completed with a dive buddy who already
holds a night diving certification. The diver shall be free of scientific tasks (besides simple observations) and extra equipment.

b) Plan and execute a minimum of two additional night dives to a maximum depth of 60 feet. These dives must be completed with a dive buddy who already holds a night diving certification. The diver shall be free of scientific tasks (besides simple observations) and extra equipment.

Divers unfamiliar with the dive site where a night dive will occur should conduct a day dive at that site prior to the night dive.

4.60 Maintaining Active Status

Minimum Activity to Maintain Authorizations

During any 12-month period, each scientific diver must log a minimum of 12 scientific, scientific training, or proficiency dives. At least one dive must be logged near the maximum depth, as defined by the DCB, of the diver’s authorization during each 6-month period. Divers authorized to 130 feet or deeper may satisfy these requirements with dives to 100 feet or deeper. Failure to meet these requirements will result in revocation or restriction of authorization by the DSO under procedures established by the DCB.

Requalification of Authorization

Once the initial requirements of Section 4.00 are met, divers whose depth authorization has lapsed due to lack of activity may be requalified by procedures adopted by the DCB.

Medical Examination

All scientific divers must pass a medical examination at the intervals specified in Section 5.0. A medically cleared diver experiencing any Conditions Which May Disqualify Candidates From Diving (Appendix 1) must receive clearance to return to diving from a physician before resuming diving activities. This medical examination requirement cannot be waived for any diver.

Emergency Care Training

The scientific diver must hold current training in the following:

• Adult CPR and AED
• Emergency oxygen administration
• First aid for diving accidents

4.70 Revocation of Authorization

An individual’s scientific diver certification can be restricted or revoked for cause by the DCB. Authorizations associated with an individual’s scientific diver certification may be restricted or suspended for cause by the DSO. Restrictions or suspensions issued by the DSO may be rescinded by the DSO; these issues will be reported to and reviewed by the DCB, and the outcomes or actions resulting from this review will be documented in the diver’s record. Violations of regulations set forth in this Manual or other governmental subdivisions not in conflict with this Manual, or demonstration of poor judgement, may be considered cause. The DCB or designee must inform the diver in writing of the reason(s) for revocation. The diver will be given the opportunity to present their case in writing to the DCB for reconsideration. Following revocation, the diver may be reauthorized after complying with conditions the DCB may impose. All such written statements and requests, as identified in this section, are formal documents, and therefore part of the diver’s file.
SECTION 5.00 MEDICAL STANDARDS

5.10 Medical Requirements

General

- All medical evaluations required by this Manual must be performed by, or under the direction of, a licensed physician of the applicant-diver’s choice, preferably one trained in diving/undersea medicine.
- The diver should be free of any chronic disabling disease and any conditions contained in the list of conditions for which restrictions from diving are generally recommended. (Appendix 1)
- Walla Walla University must verify that divers have been declared by the examining medical authority to be fit to engage in diving activities.

5.20 Frequency of Medical Evaluations

<table>
<thead>
<tr>
<th>Medical evaluation must be completed:</th>
<th>Before Age 40</th>
<th>Ages 40-59</th>
<th>Age 60 and After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before a diver may begin diving, unless an equivalent initial medical evaluation has been given within the preceding 5 years</td>
<td>Before a diver may begin diving, unless an equivalent initial medical evaluation has been given within the preceding 3 years</td>
<td>Before a diver may begin diving, unless an equivalent initial medical evaluation has been given within the preceding 2 years</td>
<td></td>
</tr>
<tr>
<td>At 5-year intervals</td>
<td>At 3-year intervals</td>
<td>At 2-year intervals</td>
<td></td>
</tr>
</tbody>
</table>

Clearance to return to diving must be obtained from a healthcare provider following a medically cleared diver experiencing any Conditions Which May Disqualify Candidates From Diving (Appendix 1), or following any major injury or illness, or any condition requiring chronic medication. If the condition is pressure related, the clearance to return to diving must come from a physician trained in diving medicine.

5.30 Information Provided Examining Physician

Walla Walla University will provide a copy of the medical evaluation requirements of this Manual to the scientific diver or scientific diver applicant, who will provide a copy to the examining physician. (Appendices 1, 2, and 3).

5.40 Content of Medical Evaluations

Medical examinations conducted initially and at the intervals specified in Section 5.20 must consist of the following:

1. Diving physical examination (Appendix 2). Modifications or omissions of required tests are not permitted
2. Applicant agreement for release of medical information to the Diving Safety Officer and the DCB
Appendix 2b)

3. Medical history (Appendix 3)

5.50 Physician’s Written Report

- A Medical Evaluation of Fitness For Scuba Diving Report signed by the examining physician stating the individual’s fitness to dive, including any recommended restrictions or limitations will be submitted to Walla Walla University for the diver’s record after the examination is completed.
- The Medical Evaluation of Fitness For Scuba Diving Report will be reviewed by the DCB or designee, and the diver’s record and authorizations will be updated accordingly.
- A copy of any physician’s written reports will be made available to the individual.
- It is the diver’s responsibility to provide to Walla Walla University a written statement from the examining medical authority listing any restrictions, limitations, or clearances to dive resulting from medical examinations obtained by the individual outside of their normal diving medical examination cycle. These statements will be reviewed by the DCB or designee and the diver’s record and authorizations will be updated accordingly.
Volume 2

Sections 6.00 through 12.00
Required Only When Conducting Described Diving Activities
and
Organizational Member Specific Sections
SECTION 6.00 NITROX DIVING

This section describes the requirements for authorization and use of nitrox for Scientific Diving.

6.10 Requirements for Nitrox Authorization

Prior to authorization to use nitrox, the following minimum requirements must be met:

Prerequisites

Only a certified Scientific Diver or DIT diving under the auspices of Walla Walla University is eligible for authorization to use nitrox.

Application for authorization to use nitrox must be made to the DCB. Submission of documents and participation in aptitude examinations does not automatically result in authorization to use nitrox. The applicant must convince the DCB through the DSO that they are sufficiently knowledgeable, skilled and proficient in the theory and use of nitrox for diving.

Training

In lieu of writing/promulgating AAUS specific training standards for Nitrox divers, AAUS references the standards for Nitrox diver training as defined by the WRSTC and/or ISO. AAUS programs who wish to train Nitrox divers may do so using one of the following options:

a) Under the auspices and standards of an internationally recognized diver training agency.

b) Under the auspices of AAUS using the minimum guidelines presented by the most current version of the RSTC/WRSTC and/or ISO Nitrox diver training standards.

References:


“Recreational diving services- Requirements for training programs on enriches air nitrox (EAN) diving”. ISO 11107:2009 - International Organization for Standardization (ISO), www.iso.org

Practical Evaluation

- Oxygen analysis of nitrox mixtures.
- Determination of Maximum Safe Operating Depth (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 Equivalent Air Depth (EAD) method using air dive tables, and/or using nitrox dive tables, as approved by the DCB.
- Nitrox dive computer use may be included, as approved by the DCB.
- A minimum of two supervised open water dives using nitrox is required for authorization.
Written Evaluation

- Function, care, use, and maintenance of equipment cleaned for nitrox use.
- Physical and physiological considerations of nitrox diving (e.g.: $O_2$ and $CO_2$ toxicity)
- Diving regulations, procedures/operations, and dive planning as related to nitrox diving
- Equipment marking and maintenance requirements
- Dive table and/or dive computer usage
- Calculation of: MOD, $pO_2$, and other aspects of Nitrox diving as required by the DCB

6.20 Minimum Activity to Maintain Authorization

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

6.30 Operational Requirements

**Oxygen Exposure Limits**

- The inspired oxygen partial pressure experienced at depth should not exceed 1.6 ATA.
- The maximum allowable exposure limit should be reduced in cases where cold or strenuous dive conditions, or extended exposure times are expected.

**Calculation of Decompression Status**

- A set of DCB approved nitrox dive tables should be available at the dive site.
- Dive computers may be used to compute decompression status during nitrox dives. Manufacturers’ guidelines and operation instructions should be followed.
- Dive computers capable of $pO_2$ limit and $fO_2$ adjustment should be checked by the diver prior to the start each dive to ensure conformity with the mix being used.

**Gas Mixture Requirements**

- Only nitrox mixtures and mixing methods approved by the DCB may be used.
- Walla Walla University personnel mixing nitrox must be qualified and approved by the DCB for the method(s) used.
- Oxygen used for mixing nitrox should meet the purity levels for “Medical Grade” (U.S.P.) or “Aviator Grade” standards.
- In addition to the AAUS Air Purity Guidelines outlined in Section 3.60, any air that may come in contact with oxygen concentrations greater than 40% (i.e., during mixing), must also have a hydrocarbon contaminant no greater than .01 mg/m$^3$.
  - For remote site operations using compressors not controlled by Walla Walla University where this is not verifiable, the DCB must develop a protocol to mitigate risk to the diver.

**Analysis Verification by User**

- Prior to the dive, it is the responsibility of each diver to analyze the oxygen content of his/her scuba cylinder and acknowledge in writing the following information for each cylinder: $fO_2$, MOD, cylinder pressure, date of analysis, and user’s name.
- Individual dive log reporting forms should report $fO_2$ of nitrox used, if different than 21%.
6.40 Nitrox Diving Equipment

**Required Equipment**

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

- Labeled SCUBA Cylinders in Accordance with Industry Standards
- Oxygen Analyzers
- Oxygen compatible equipment as applicable

**Requirement for Oxygen Service**

- All equipment, which during the dive or cylinder filling process is exposed to concentrations greater than 40% oxygen, should be cleaned and maintained for oxygen service.
- Any equipment used with oxygen or mixtures containing over 40% by volume oxygen must be designed and maintained for oxygen service. Oxygen systems over 125 psig must have slow-opening shut-off valves.
Walla Walla University and its Scientific Diving program currently do not practice, support, or provide training or diving for any of the activities in Sections 7-12 as listed below. See the AAUS Standards for Scientific Diving Manual (www.aaus.org/About/Diving Standards) for definitions and descriptions of these activities.

SECTION 7.00 Surface Supplied Diving Technologies

SECTION 8.00 Staged Decompression Diving

SECTION 9.00 Mixed Gas Diving

SECTION 10.00 Specialized Diving Environments
10.10 Blue Water Diving
10.20 Ice and Polar Diving
10.30 Overhead Environments
10.40 Saturation Diving
10.50 Aquarium Diving

SECTION 11.00 Rebreathers

SECTION 12.00 Scientific Cave and Cavern Diving
Appendices

Appendix 1 Through 8 Or Equivalent
Required For All AAUS Organizational Members
APPENDIX 1
DIVING MEDICAL EXAM OVERVIEW FOR THE EXAMINING PHYSICIAN
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 Walla Walla University. 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, the Undersea Hyperbaric and Medical Society, or the Divers Alert Network. Please contact the Diving Safety Officer if you have any questions or concerns. Thank you for your assistance.

James R. Nestler, Ph.D.
Diving Safety Officer, Walla Walla University
Office: 509-527-2551
Cell: 509-540-9984
jim.nestler@wallawalla.edu

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. Recent deaths in the scientific diving community have been attributed to cardiovascular disease. 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]
4. Recent ocular surgery. [15, 18, 19]
5. Psychiatric disorders including claustrophobia, suicidal ideation, psychosis, anxiety states, untreated depression. [20 - 23]
6. Substance abuse, including alcohol. [24 - 25]
7. Episodic loss of consciousness. [1, 26, 27]
8. History of seizure. [27, 28]
9. History of stroke or a fixed neurological deficit. [29, 30]
10. Recurring neurologic disorders, including transient ischemic attacks. [29, 30]
11. History of intracranial aneurysm, other vascular malformation or intracranial hemorrhage. [31]
12. History of neurological decompression illness with residual deficit. [29, 30]
13. Head injury with sequelae. [26, 27]
14. Hematologic disorders including coagulopathies. [41, 42]
15. Evidence of coronary artery disease or high risk for coronary artery disease. [33 - 35]
16. Atrial septal defects. [39]
17. Significant valvular heart disease - isolated mitral valve prolapse is not disqualifying. [38]
18. Significant cardiac rhythm or conduction abnormalities. [36 - 37]
19. Implanted cardiac pacemakers and cardiac defibrillators (ICD). [39, 40]
20. Inadequate exercise tolerance. [34]
21. Severe hypertension. [35]
22. History of spontaneous or traumatic pneumothorax. [45]
23. Asthma. [42 - 44]
24. Chronic pulmonary disease, including radiographic evidence of pulmonary blebs, bullae, or cysts. [45, 46]
25. Diabetes mellitus. [46 - 47]
26. Pregnancy. [56]
SELECTED REFERENCES IN DIVING MEDICINE
Available from Best Publishing Company, P.O. Box 30100, Flagstaff, AZ 86003-0100, the Divers Alert Network (DAN) or the Undersea and Hyperbaric Medical Society (UHMS), Durham, NC

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

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

To The Examining Physician: Scientific divers require periodic scuba diving medical examinations to assess their fitness to engage in diving with self-contained underwater breathing apparatus (scuba). Their answers on the Diving Medical History Form may indicate potential health or safety risks as noted. Scuba diving is an activity that puts unusual stress on the individual in several ways. Your evaluation is requested on this Medical Evaluation form. Your opinion on the applicant's medical fitness is requested. Scuba diving requires heavy exertion. The diver must be free of cardiovascular and respiratory disease (see references, following page). An absolute requirement is the ability of the lungs, middle ears and sinuses to equalize pressure. Any condition that risks the loss of consciousness should disqualify the applicant. Please proceed in accordance with the Walla Walla University Medical Standards (Sec. 5.00). If you have questions about diving medicine, please consult with the Undersea Hyperbaric Medical Society or Divers Alert Network.

TESTS: THE FOLLOWING TESTS ARE REQUIRED:

DURING INITIAL EXAMS (ALL AGES) AND PERIODIC RE-EXAMS (UNDER AGE 40):
- Medical history
- Complete physical exam, with emphasis on neurological and otological components
- Urinalysis
- Any further tests deemed necessary by the physician

AGE 40 AND OVER - ADDITIONAL TESTS DURING INITIAL EXAM AND PERIODIC RE-EXAMS:
- Chest x-ray (Required only during first exam age 40 and over)
- Resting EKG
- Assessment of coronary artery disease using Multiple-Risk-Factor Assessment¹
  (age, lipid profile, blood pressure, diabetic screening, smoking)
  Note: Exercise stress testing may be indicated based on Multiple-Risk-Factor Assessment¹

PHYSICIAN'S STATEMENT:
I have evaluated the above mentioned individual according to the tests listed above. 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.

01 I find no medical conditions that may be disqualifying for participation in scuba diving.

Diver IS medically qualified to dive for:

<table>
<thead>
<tr>
<th>Age Group</th>
<th>2 years (age 60 and over)</th>
<th>3 years (age 40-59)</th>
<th>5 years (age under 40)</th>
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</table>

02 Diver IS NOT medically qualified to dive: Permanently Temporarily.

MD or DO ____________________________ Date ____________________________

Name (Print or Type) ____________________________

Address ____________________________

Telephone Number ____________________________ E-Mail Address ____________________________

My familiarity with applicant is: This exam only Regular physician for _______ years

My familiarity with diving medicine is: ____________________________
APPENDIX 2b
AAUS MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING REPORT
APPLICANT'S RELEASE OF MEDICAL INFORMATION FORM
MEDICAL EVALUATION OF FITNESS FOR SCUBA DIVING REPORT

APPLICANT’S RELEASE OF MEDICAL INFORMATION FORM

____________________________________________________________________________________

Name of Applicant (Print or Type)

I authorize the release of this information and all medical information subsequently acquired in association with my scuba diving to the Walla Walla University Diving Safety Officer and Diving Control Board or their designee at Walla Walla University

Signature of Applicant __________________________________________________    Date ______________________

____________________________________________________________________________________

REFERENCES

DIVING MEDICAL HISTORY FORM
(To Be Completed By Applicant-Diver)

Name ______________________________________  DOB ________ Age ______ Wt.______ Ht.______

Sponsor: Walla Walla University  Today’s Date _____/_____/_____
(Month/Day/Year)

TO THE APPLICANT:

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

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

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

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<th></th>
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<th>Please indicate whether or not the following apply to you</th>
<th>Comments</th>
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<tbody>
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<td>1</td>
<td>Yes</td>
<td>Convulsions, seizures, or epilepsy</td>
<td></td>
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<td>2</td>
<td>Yes</td>
<td>Fainting spells or dizziness</td>
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<td>3</td>
<td>Yes</td>
<td>Been addicted to drugs</td>
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<td>4</td>
<td>Yes</td>
<td>Diabetes</td>
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<td>5</td>
<td>Yes</td>
<td>Motion sickness or sea/air sickness</td>
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<td>6</td>
<td>Yes</td>
<td>Claustrophobia</td>
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<td>7</td>
<td>Yes</td>
<td>Mental disorder or nervous breakdown</td>
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<td>8</td>
<td>Yes</td>
<td>Are you pregnant?</td>
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<td>9</td>
<td>Yes</td>
<td>Do you suffer from menstrual problems?</td>
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<td>10</td>
<td>Yes</td>
<td>Anxiety spells or hyperventilation</td>
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<td>11</td>
<td>Yes</td>
<td>Frequent sour stomachs, nervous stomachs or vomiting spells</td>
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<td>12</td>
<td>Yes</td>
<td>Had a major operation</td>
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<td>13</td>
<td>Yes</td>
<td>Presently being treated by a physician</td>
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<td>14</td>
<td>Yes</td>
<td>Taking any medication regularly (even non-prescription)</td>
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<td>15</td>
<td>Yes</td>
<td>Been rejected or restricted from sports</td>
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<td>16</td>
<td>Yes</td>
<td>Headaches (frequent and severe)</td>
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<td>17</td>
<td>Yes</td>
<td>Wear dental plates</td>
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<td>18</td>
<td>Yes</td>
<td>Wear glasses or contact lenses</td>
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<td>19</td>
<td>Yes</td>
<td>Bleeding disorders</td>
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<td>20</td>
<td>Yes</td>
<td>Alcoholism</td>
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<td>21</td>
<td>Yes</td>
<td>Any problems related to diving</td>
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<td>22</td>
<td>Yes</td>
<td>Nervous tension or emotional problems</td>
<td></td>
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<tr>
<td>Yes</td>
<td>No</td>
<td>Please indicate whether or not the following apply to you</td>
<td>Comments</td>
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<td>23</td>
<td></td>
<td>Take tranquilizers</td>
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<td>24</td>
<td></td>
<td>Perforated ear drums</td>
<td></td>
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<td>25</td>
<td></td>
<td>Hay fever</td>
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<td>26</td>
<td></td>
<td>Frequent sinus trouble, frequent drainage from the nose, post-nasal drip, or stuffy nose</td>
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<td>27</td>
<td></td>
<td>Frequent earaches</td>
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<td>28</td>
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<td>Drainage from the ears</td>
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<td>29</td>
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<td>Difficulty with your ears in airplanes or on mountains</td>
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<td>30</td>
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<td>Ear surgery</td>
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<td>31</td>
<td></td>
<td>Ringing in your ears</td>
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<td>32</td>
<td></td>
<td>Frequent dizzy spells</td>
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<td>33</td>
<td></td>
<td>Hearing problems</td>
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<td>34</td>
<td></td>
<td>Trouble equalizing pressure in your ears</td>
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<td>35</td>
<td></td>
<td>Asthma</td>
<td></td>
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<tr>
<td>36</td>
<td></td>
<td>Wheezing attacks</td>
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<td>37</td>
<td></td>
<td>Cough (chronic or recurrent)</td>
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<td>38</td>
<td></td>
<td>Frequently raise sputum</td>
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<td>39</td>
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<td>Pleurisy</td>
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<td>40</td>
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<td>Collapsed lung (pneumothorax)</td>
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<td>41</td>
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<td>Lung cysts</td>
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<td>42</td>
<td></td>
<td>Pneumonia</td>
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<td>43</td>
<td></td>
<td>Tuberculosis</td>
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<td>44</td>
<td></td>
<td>Shortness of breath</td>
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<td>45</td>
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<td>Lung problem or abnormality</td>
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<td>46</td>
<td></td>
<td>Spit blood</td>
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<td>47</td>
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<td>Breathing difficulty after eating particular foods, after exposure to particular pollens or animals</td>
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<td>48</td>
<td></td>
<td>Are you subject to bronchitis</td>
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<td>49</td>
<td></td>
<td>Subcutaneous emphysema (air under the skin)</td>
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<td>50</td>
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<td>Air embolism after diving</td>
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<td>51</td>
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<td>Decompression sickness</td>
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<td>52</td>
<td></td>
<td>Rheumatic fever</td>
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<td>53</td>
<td></td>
<td>Scarlet fever</td>
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<td>54</td>
<td></td>
<td>Heart murmur</td>
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<td>55</td>
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<td>Large heart</td>
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<td>56</td>
<td></td>
<td>High blood pressure</td>
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<td>57</td>
<td></td>
<td>Angina (heart pains or pressure in the chest)</td>
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<td>58</td>
<td></td>
<td>Heart attack</td>
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<td>Yes</td>
<td>No</td>
<td>Please indicate whether or not the following apply to you</td>
<td>Comments</td>
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<td>59</td>
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<td>Low blood pressure</td>
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<td>60</td>
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<td>Recurrent or persistent swelling of the legs</td>
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<td>61</td>
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<td>Pounding, rapid heartbeat or palpitations</td>
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<td>62</td>
<td></td>
<td>Easily fatigued or short of breath</td>
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<td>63</td>
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<td>Abnormal EKG</td>
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<td>64</td>
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<td>Joint problems, dislocations or arthritis</td>
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<td>65</td>
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<td>Back trouble or back injuries</td>
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<td>66</td>
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<td>Ruptured or slipped disk</td>
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<td>67</td>
<td></td>
<td>Limiting physical handicaps</td>
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<td>68</td>
<td></td>
<td>Muscle cramps</td>
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<td>69</td>
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<td>Varicose veins</td>
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<td>70</td>
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<td>Amputations</td>
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<td>71</td>
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<td>Head injury causing unconsciousness</td>
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<td>72</td>
<td></td>
<td>Paralysis</td>
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<td>73</td>
<td></td>
<td>Have you ever had an adverse reaction to medication?</td>
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<td>74</td>
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<td>Do you smoke?</td>
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<td>75</td>
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<td>Have you ever had any other medical problems not listed?</td>
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<td>76</td>
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<td>Is there a family history of high cholesterol?</td>
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<td>77</td>
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<td>Is there a family history of heart disease or stroke?</td>
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<td>Is there a family history of diabetes?</td>
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<td>79</td>
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<td>Is there a family history of asthma?</td>
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<td>80</td>
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<td>Date of last tetanus shot?</td>
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<td></td>
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<td>Vaccination dates?</td>
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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 of Applicant-Diver

Date
APPENDIX 4
RECOMMENDED PHYSICIANS WITH EXPERTISE IN DIVING MEDICINE

A List of Medical Doctors that have training and expertise in diving or undersea medicine can be found through the Undersea and Hyperbaric Medical Society or Divers Alert Network. See links below
https://www.uhms.org/resources/diving-medical-examiners-list.html
https://www.diversalertnetwork.org/medical/physicians.asp

Currently no physicians on the above lists are located near Walla Walla/College Place WA. We suggest that you contact a recommended physician near you, or request your primary/personal physician to consult with one of the recommended physicians.

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<th>Name:</th>
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APPENDIX 5
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.

Alternate Gas Supply - A fully redundant system capable of providing a gas source to the diver should their primary gas supply fail.

Authorization - The DCB authorizes divers to dive using specialized modes of diving, and the depth they may dive to.

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

Bubble Check - Visual examination by the dive team of their diving systems, looking for O-ring leaks or other air leaks conducted in the water prior to entering a cave. Usually included in the "S" Drill.

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

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

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

Cave Dive - A dive, which takes place partially or wholly underground, in which one or more of the environmental parameters defining a cavern dive are exceeded.

Cavern Dive - A dive which takes place partially or wholly underground, in which natural sunlight is continuously visible from the entrance.

Certified Diver - A diver who holds a recognized valid certification from an AAUS OM or internationally recognized certifying agency.

(Scientific Diver) Certification - A diver who holds a recognized valid certification from an AAUS OM

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

Designated Person-In-Charge – Surface Supplied diving mode manning requirement. An individual designated by the OM DCB or designee with the experience or training necessary to direct, and oversee in the surface supplied diving operation being conducted.

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

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

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

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

**Diver** – A person who stays underwater for long periods by having compressed gas supplied from the surface or by carrying a supply of compressed gas.

**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.

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

**Diving Control Board (DCB)** - Group of individuals who act as the official representative of the membership organization in matters concerning the scientific diving program (See Diving Control Board under Section 1.0).

**Diving Safety Officer (DSO)** - Individual responsible for the safe conduct of the scientific diving program of the membership organization (See Diving Safety Officer under Section 1.0).

**DPIC** – See Designated Person-In-Charge.

**EAD** - Equivalent Air Depth (see below).

**Emergency Swimming Ascent** - An ascent made under emergency conditions where the diver may exceed the normal ascent rate.

**Enriched Air (EANx)** - A name for a breathing mixture of air and oxygen when the percent of oxygen exceeds 21%. This term is considered synonymous with the term “nitrox” (Section 6.00).

**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.

**Flooded Mine Diving** - Diving in the flooded portions of a man-made mine. Necessitates use of techniques detailed for cave diving.

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

**FSW** - Feet of seawater.

**Gas Management** - Gas planning rule which is used in cave diving environments in which the diver reserves a portion of their available breathing gas for anticipated emergencies (See Rule of Thirds, Sixths).

**Gas Matching** - The technique of calculating breathing gas reserves and turn pressures for divers using different volume cylinders. Divers outfitted with the same volume cylinders may employ the Rule of Thirds for gas management purposes. Divers outfitted with different volume cylinders will not observe the same gauge readings when their cylinders contain the same gas volume, therefore the Rule of Thirds will not guarantee adequate reserve if both divers must breathe from a single gas volume at a Rule of Thirds turn pressure. Gas Matching is based on individual consumption rates in volume consumed per minute. It allows divers to calculate turn pressures based on combined consumption rates and to convert the required reserve to a gauge based turn pressure specific to each diver’s cylinder configuration.

**Guideline** - Continuous line used as a navigational reference during a dive leading from the team position to a point where a direct vertical ascent may be made to the surface.
**Hookah** - While similar to Surface Supplied in that the breathing gas is supplied from the surface by means of a pressurized hose, the supply hose does not require a strength member, pneumofathometer hose, or communication line. Hookah equipment may be as simple as a long hose attached to a standard scuba cylinder supplying a standard scuba second stage. The diver is responsible for the monitoring his/her own depth, time, and diving profile.

**Hyperbaric Chamber** - See Recompression Chamber.

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

**Independent 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.

**Jump/Gap Reel** - Spool or reel used to connect one guide line to another thus ensuring a continuous line to the exit.

**Life Support Equipment** – Underwater equipment necessary to sustain life.

**Lead Diver** - Certified scientific diver with experience and training to conduct the diving operation.

**Organizational Member (OM)** - 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 Manual.

**Manifold with Isolator Valve** - A manifold joining two diving cylinders, that allows the use of two completely independent regulators. If either regulator fails, it may be shut off, allowing the remaining regulator access to the gas in both of the diving cylinders.

**Mixed Gas** - Breathing gas containing proportions of inert gas other than nitrogen greater than 1% by volume.

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

**MOD** - Maximum Operating Depth, usually determined as the depth at which the pO$_2$ for a given gas mixture reaches a predetermined maximum.

**Nitrox** - Any gas mixture comprised predominately of nitrogen and oxygen, most frequently containing between 22% and 40% oxygen. Also be referred to as Enriched Air Nitrox, abbreviated EAN.

**Normal Ascent** - An ascent made with an adequate air supply at a rate of 30 feet per minute or less.

**OTU** - Oxygen Toxicity Unit

**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.

**Penetration Distance** - Linear distance from the entrance intended or reached by a dive team during a dive at a dive site.

**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.

$pO_2$ - Inspired partial pressure of oxygen, usually expressed in units of atmospheres absolute.

Primary Reel - Initial guideline used by the dive team from open water to maximum penetration or a permanently installed guideline.

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

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

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

Restriction - Any passage through which two divers cannot easily pass side by side while sharing air.

Rule of Thirds - Gas planning rule which is used in cave diving environments in which the diver reserves 2/3’s of their breathing gas supply for exiting the cave or cavern.

Rule of Sixths - Air planning rule which is used in cave or other confined diving environments in which the diver reserves 5/6’s of their breathing gas supply (for DPV use, siphon diving, etc.) for exiting the cave or cavern.

Safety Drill - ("S" Drill) - Short gas sharing, equipment evaluation, dive plan, and communication exercise carried out prior to entering a cave or cavern dive by the dive team.

Safety Reel - Secondary reel used as a backup to the primary reel, usually containing 150 feet of guideline that is used in an emergency.

Safety Stop – A stop made between 15-20 feet (5-6 meters) for 3-5 minutes during the final ascent phase of a dive.

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.

Side Mount - A diving mode utilizing two independent SCUBA systems carried along the sides of the diver's body; either of which always has sufficient air to allow the diver to reach the surface unassisted.

Siphon - Cave into which water flows with a generally continuous in-current.

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

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

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

Tender - Used in Surface supplied and tethered diving. The tender comprises the topsides buddy for the in-water diver on the other end of the tether. The tender must have the experience or training to perform the assigned tasks in a safe and healthful manner.
*Turn Pressure* – The gauge reading of a diver’s open circuit scuba system designating the gas limit for terminating the dive and beginning the exit from the water.

*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.
APPENDIX 6

AAUS REQUEST FOR DIVING RECIPROCITY FORM
VERIFICATION OF DIVER TRAINING AND EXPERIENCE
APPENDIX 7
EMERGENCY ACTION PLAN

Introduction
A diving accident victim could be any person who has been breathing compressed gas underwater regardless of depth. It is essential that emergency procedures are pre-planned and that medical treatment is initiated as soon as possible. It is the responsibility of each AAUS OM to develop procedures for diving emergencies including evacuation and medical treatment for each dive location.

Rapid access to emergency care and treatment is crucial in a diving-related emergency. A cell phone and a VHF radio are means of effectively contacting emergency services (fire/rescue, Coast Guard, medical, police), and must be available and easily accessible on all dives. The most effective means of contact are:
- Dial 911
- Contact the Coast Guard on VHF channel 16

Primary Sites of Advanced Medical Treatment for Diving Accidents

Washington
Virginia Mason Hospital, Seattle (206) 583-6543
Fairchild AFB, Spokane (509) 247-5406
U.S. Naval Torpedo Station, Keyport (206) 396-2552

British Columbia
Vancouver General Hospital, Vancouver (604) 875-4111
Fleet Diving Unit Pacific, Victoria (604) 388-1781

Oregon
Providence Hospital, Portland (503) 230-6061

Site-Specific Emergency Action Plans
An Emergency Action Plan specific for each dive site must be approved by the DSO, reviewed by all divers, and easily accessible for all dives.
# SCUBA EMERGENCY ACTION PLAN

## STOP BREATHE THINK ACT

### YOUR LOCATION

<table>
<thead>
<tr>
<th>Dive Site:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Your Land Exit Point in a Scuba Emergency:</td>
</tr>
<tr>
<td>Location Information for Emergency Services:</td>
</tr>
</tbody>
</table>

### EMERGENCY SERVICES

<table>
<thead>
<tr>
<th>Location of Nearest Phone: (and access, if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Emergency Phone Number: 911 (for local emergency services)</td>
</tr>
<tr>
<td>VHF Radio Emergency Channel: 16</td>
</tr>
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</table>

### FIRST AID & MEDICAL ASSISTANCE

<table>
<thead>
<tr>
<th>Location of O₂ Kit:</th>
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<td></td>
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<tr>
<td>Location of First Aid Kit:</td>
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</table>

### Nearest Hospital

<table>
<thead>
<tr>
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<td></td>
</tr>
<tr>
<td>Phone Number:</td>
</tr>
<tr>
<td>Location:</td>
</tr>
</tbody>
</table>

### Nearest Chamber

<table>
<thead>
<tr>
<th>Name:</th>
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<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Phone Number:</td>
</tr>
<tr>
<td>Location:</td>
</tr>
</tbody>
</table>
General Procedures
Depending on and according to the nature of the diving accident:
1. Make appropriate contact with victim or rescue as required.
2. Establish (A)irway (B)reathing (C)irculation or (C)irculation (A)irway (B)reathing as appropriate
3. Stabilize the victim
4. Administer 100% oxygen, if appropriate (in cases of Decompression Illness, or Near Drowning).
5. Call local Emergency Medical System (EMS) for transport to nearest medical treatment facility.
   Explain the circumstances of the dive incident to the evacuation teams, medics and physicians.
   Do not assume that they understand why 100% oxygen may be required for the diving accident
   victim or that recompression treatment may be necessary.
6. Call Divers Alert Network (919-684-9111) for contact with diving physician, recompression
   chamber, evacuation, etc.
7. Notify DSO.
8. Complete and submit appropriate Accident/Incident Report Forms to the DCB and AAUS.

Missing Diver Procedures
1. Assess the degree of urgency. Consider time overdue, planned dive profile, where and when diver
   was last seen.
2. Recall all divers.
3. Determine last known location. Mark with buoy, assign spotters, take compass headings to
   landmarks.
4. Scan the surface/shoreline for divers and bubbles.
5. Activate local EMS by dialing 911 or contacting the Coast Guard on VHF channel 16.
6. Any underwater search should be performed only by rescue-trained buddy divers, WITHOUT
   ENDANGERING OTHERS INCLUDING THE RESCUERS.
7. Notify DSO.
8. Complete and submit appropriate Accident/Incident Report Forms to the DCB and AAUS.

Emergency Telephone Numbers

Local Emergency Services

<table>
<thead>
<tr>
<th>Name</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jim Nestler, Diving Safety Officer</td>
<td>(509) 540-9984 (cell)</td>
</tr>
<tr>
<td>Divers Alert Network (DAN)</td>
<td>(919) 684-9111</td>
</tr>
<tr>
<td>Dave Habenicht, Rosario Facilities Manager</td>
<td>(360) 661-5105 (cell)</td>
</tr>
<tr>
<td>WWU Campus Security (College Place)</td>
<td>(509) 527-2222</td>
</tr>
<tr>
<td>Island Hospital, Anacortes (Emergency Room)</td>
<td>(360) 299-1311</td>
</tr>
<tr>
<td>WhidbeyHealth Medical Center, Coupeville</td>
<td>(360) 678-5151</td>
</tr>
<tr>
<td>Virginia Mason Hospital (Emergency Room)</td>
<td>(206) 583-6433</td>
</tr>
<tr>
<td>Virginia Mason Hospital (Hyperbaric Unit)</td>
<td>(206) 583-6543</td>
</tr>
<tr>
<td>Coast Guard Rescue Coordination Center, Seattle</td>
<td>(206) 220-7001</td>
</tr>
<tr>
<td>Joint Rescue Coordination Center, Victoria</td>
<td>(800) 567-5111</td>
</tr>
</tbody>
</table>

STOP           BREATHE           THINK           ACT
APPENDIX 8
AAUS STATISTICS COLLECTION CRITERIA AND DEFINITIONS

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

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

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

A Dive is defined as a descent underwater utilizing compressed gas and subsequent ascent/return to the surface with a minimum surface interval of 10 minutes.

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

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

Incident(s) that occur during the collection cycle: Only incidents that occurred during, or resulting from, a dive where the diver is breathing a compressed gas will be submitted to AAUS.

DEFINITIONS:

Dive Classification:

- Scientific Dives: Dives that meet the scientific diving exemption as defined in 29 CFR 1910.402. Diving tasks traditionally associated with a specific scientific discipline are considered a scientific dive. Construction and trouble-shooting tasks traditionally associated with commercial diving are not considered a scientific dive.
- Training and Proficiency Dives: Dives performed as part of a scientific diver-training program, or dives performed in maintenance of a scientific diving certification/authorization.

Breathing Gas:

- Air: Dives where the bottom gas used for the dive is air.
- Nitrox: Dives where the bottom gas used for the dive is a combination of nitrogen and oxygen percentages different from those of air.
• Mixed Gas: Dives where the bottom gas used for the dive is a combination of oxygen, nitrogen, and helium (or other inert gas), or any other breathing gas combination not classified as air or nitrox.

Diving Mode:

• Open Circuit SCUBA: Dives where the breathing gas is inhaled from a self-contained underwater breathing apparatus and all of the exhaled gas leaves the breathing loop.
• Surface Supplied: Dives where the breathing gas is supplied from the surface by means of a pressurized umbilical hose. The umbilical generally consists of a gas supply hose, strength member, pneumofathometer hose, and communication line. The umbilical supplies a helmet or full-face mask. The diver may rely on the tender at the surface to monitor the divers’ depth, time and diving profile.
• Hookah: While similar to Surface Supplied in that the breathing gas is supplied from the surface by means of a pressurized hose, the supply hose does not require a strength member, pneumofathometer hose, or communication line. Hookah equipment may be as simple as a long hose attached to a standard scuba cylinder supplying a standard scuba second stage. The diver is responsible for monitoring his/her own depth, time, and diving profile.
• Rebreathers: Dives where the breathing gas is repeatedly recycled in a breathing loop. The breathing loop may be fully closed or semi-closed. Note: A rebreather dive ending in an open circuit bailout is still logged as a rebreather dive.

Decompression Planning and Calculation Method:

• Dive Tables
• Dive Computer
• PC Based Decompression Software

Depth Ranges:

Depth ranges for sorting logged dives are: 0-30, 31-60, 61-100, 101-130, 131-150, 151-190, 191-250, 251-300, and 301->. Depths are in feet (when measured in meters: 0-10, >10-30, >30-40, >40-45, >45-58, >58-76, >76-92, and >92->). A dive is logged to the maximum depth reached during the dive. Note: Only "The Number of Dives Logged" and "The Number of Divers Logging Dives" will be collected for this category.

Specialized Environments:

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

Incident Types:

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

Incident Classification Rating Scale:

• Minor: Injuries that the OM considers being minor in nature. Examples of this classification of incident would include, but not be limited to:
  ▪ Mask squeeze that produced discoloration of the eyes.
  ▪ Lacerations requiring medical attention but not involving moderate or severe bleeding.
  ▪ Other injuries that would not be expected to produce long term adverse effects on the diver’s health or diving status.
• Moderate: Injuries that the OM considers being moderate in nature. Examples of this classification would include, but not be limited to:
  ▪ DCS symptoms that resolved with the administration of oxygen, hyperbaric treatment given as a precaution.
  ▪ DCS symptoms resolved with the first hyperbaric treatment.
  ▪ Broken bones.
  ▪ Torn ligaments or cartilage.
  ▪ Concussion.
  ▪ Ear barotrauma requiring surgical repair.
• Serious: Injuries that the OM considers being serious in nature. Examples of this classification would include, but not be limited to:
  ▪ Arterial Gas Embolism.
  ▪ DCS symptoms requiring multiple hyperbaric treatment.
  ▪ Near drowning.
  ▪ Oxygen Toxicity.
  ▪ Hypercapnia.
  ▪ Spinal injuries.
  ▪ Heart attack.
  ▪ Fatality.
APPENDIX 9

RECOMMENDATIONS FOR RESCUE OF A SUBMERGED UNRESPONSIVE COMPRESSED-GAS DIVER

From: S.J. Mitchell et al., Undersea and Hyperbaric Medicine 2012, Vol. 39, No. 6, pages 1099-1108
APPENDIX 10
APPLICATION FOR SCIENTIFIC DIVER OR SCIENTIFIC DIVER-IN-TRAINING CERTIFICATION
## APPLICATION FOR SCIENTIFIC DIVER or SCIENTIFIC DIVER-IN-TRAINING CERTIFICATION

### PERSONAL INFORMATION

<table>
<thead>
<tr>
<th>Diver's Name</th>
<th>Today's Date</th>
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<tbody>
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<table>
<thead>
<tr>
<th>Permanent Address</th>
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<table>
<thead>
<tr>
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<table>
<thead>
<tr>
<th>Gender</th>
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### SCUBA CERTIFICATION INFORMATION

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<tr>
<th>Certification Level</th>
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<th>Date Certified</th>
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<tr>
<td>Open Water</td>
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<tr>
<td>Advanced Open Water</td>
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<tr>
<td>Rescue Diver</td>
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<td></td>
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<tr>
<td>Divemaster</td>
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<tr>
<td>Instructor</td>
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<tr>
<td>DAN Divers First Aid for Professional Divers</td>
<td>Divers Alert Network</td>
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<tr>
<td>Other:</td>
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Please attach copies of certification cards

*Date of most recent certification

### SCUBA EXPERIENCE INFORMATION

<table>
<thead>
<tr>
<th>Total number of lifetime dives</th>
<th>Total number of cold water dives</th>
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<table>
<thead>
<tr>
<th>Maximum depth experienced</th>
<th>Number of dives within the last 12 months</th>
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<table>
<thead>
<tr>
<th>Date of most recent dive</th>
<th>Location of most recent dive</th>
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</tr>
<tr>
<td>Person to contact in case of emergency</td>
<td>Relationship to you</td>
</tr>
<tr>
<td>--------------------------------------</td>
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<tr>
<td>Comments or additional information</td>
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APPENDIX 11
SCIENTIFIC DIVER OR SCIENTIFIC DIVER-IN-TRAINING CERTIFICATION
## SCIENTIFIC DIVER CERTIFICATION

<table>
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<tr>
<th>Diver’s Name</th>
<th>Today’s Date</th>
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</table>

### ON FILE

- [ ] Application
- [ ] Waiver (yearly)
- [ ] Medical Clearance (good through ________)
- [ ] Scientific Diver Agreement
- [ ] DAN DFA Pro (good through ________)
- [ ] Equipment Maintenance (yearly)

### AUTHORIZATIONS

<table>
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<th>100 ft</th>
<th>130 ft</th>
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<table>
<thead>
<tr>
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<th>Yes</th>
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<tbody>
<tr>
<td>Night</td>
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<table>
<thead>
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<tbody>
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<table>
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<tbody>
<tr>
<td>Dive Computer</td>
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I have completed all requirements in Section 4.00 of the *Walla Walla University Standards for Scientific Diving Manual* which are necessary to authorize me to engage in scientific diving as a Scientific Diver. I have convinced the Diving Safety Officer and members of the Diving Control Board that I have the training, skills, and proficiencies to dive as a scientific diver without supervision. I understand that my authorization to dive can be suspended by the Diving Safety Officer or Diving Control Board if my dive-related activities and judgement are considered by them to affect the safety of me, other divers, and others who may be associated with diving.

<table>
<thead>
<tr>
<th>Signature of Scientific Diver Applicant</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Signature of Diving Safety Officer</th>
<th>Date</th>
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<tbody>
<tr>
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Comments:

---

65
# SCIENTIFIC DIVER-IN-TRAINING CERTIFICATION

<table>
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<tr>
<th>Diver’s Name</th>
<th>Today’s Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## ON FILE
- Application
- Waiver
- Medical Clearance
- Scientific Diver Agreement
- DAN DFA Pro
- Equipment Maintenance

## SKILLS
- Confined Water
- Open Water

## AUTHORIZATIONS
- Depth:  
  - 30 ft
  - 60 ft
  - 100 ft
- Night:  
  - Yes
  - No
- Nitrox:  
  - Yes
  - No
- Dive Computer:  
  - Yes
  - No

I have completed all requirements in Section 4.00 of the *Walla Walla University Standards for Scientific Diving Manual* which are necessary to authorize me to engage in scientific diving as a Scientific Diver-In-Training. I have convinced the Diving Safety Officer and members of the Diving Control Board that I have the training, skills, and proficiencies to continue training as a scientific diver under the supervision of a certified Scientific Diver, as approved by the Diving Safety Officer. I understand that my authorization to dive can be suspended by the Diving Safety Officer or Diving Control Board if my dive-related activities and judgement are considered by them to affect the safety of me, other divers, and others who may be associated with diving.

<table>
<thead>
<tr>
<th>Signature of Scientific Diver-In-Training Applicant</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signature of Diving Safety Officer</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

---

66
APPENDIX 12
SCIENTIFIC DIVING AGREEMENT
SCIENTIFIC DIVING AGREEMENT

Your signature on this statement is required as proof that you have read and agree to adhere to the regulations and procedures for scientific diving established detailed in the *Walla Walla University Standards for Scientific Diving Manual*. Please read this document carefully and direct any questions you may have to the Diving Safety Officer (DSO) or a member of the Diving Control Board before signing.

I understand that as a Scientific Diver or Scientific Diver-In-Training I must (please check each box on BOTH SIDES OF THIS PAGE):

- [ ] Read, understand, and adhere to the regulations and procedures in the *Walla Walla University Standards for Scientific Diving Manual*.

- [ ] Dive within my certification limits unless on a training dive with an authorized scientific diver.

- [ ] Refuse to dive, or terminate a dive, if any conditions are or become unfavorable.

- [ ] Report any unsafe practices to the DSO.

- [ ] Report all injuries and incidents to the DSO and proper authorities immediately, and seek appropriate treatment.

- [ ] Abide by basic safe diving practices, including but not limited to: listening intently to dive briefings and debriefings, following dive plans, maintaining proper buoyancy, never holding my breath, being proficient in dive table and/or computer use.

- [ ] Maintain personal dive gear correctly, including appropriate service requirements.

- [ ] Adhere to the buddy system on all scuba dives.

- [ ] Carry the appropriate equipment for every dive, including an alternate air source (octopus).

- [ ] Conduct functional checks of diving equipment (both mine and my buddy’s) prior to entry.

- [ ] Never ascend faster than 30 feet per minute on any dive.

(Please turn to other side)
☐ Conduct a safety stop (3-5 minute stop at 15-20 feet) if appropriate.

☐ Terminate all dives with enough air in my tank to surface with at least 500 PSI.

☐ Ensure that I understand the proper emergency procedures for each dive that I undertake, and stay current in the use of First Aid, Emergency Oxygen, CPR, and AED.

☐ Never use Walla Walla University equipment for any purpose other than its intended and approved use.

☐ Not engage in dive activities in an environment with special conditions (such as an overhead environment or blue water diving) without express consent of the Diving Control Board.

☐ Understand that I can deviate from the requirements of the Walla Walla University Standards for Scientific Diving ONLY to the extent necessary to prevent or minimize a situation that is likely to result in death, serious physical harm, or major environmental damage.

Scuba diving has inherent risks. The ultimate responsibility for my safety rests with me. It is my responsibility and duty to refuse to dive if, in my judgment, conditions are unsafe or unfavorable, or if I would be violating the precepts of my training or the regulations of the Walla Walla University Standards for Scientific Diving Manual.

I have read the above statements and have had any questions answered to my satisfaction.

Diver’s Name (please print) ________________________________

Diver’s Signature__________________________________________

Today’s Date ________________________________
WALLA WALLA UNIVERSITY
LIABILITY WAIVER, ASSUMPTION OF RISK, AND RELEASE AGREEMENT
SCUBA DIVING AND SNORKELING

BE SURE TO PRINT YOUR NAME BELOW, AND READ AND INITIAL EACH SECTION.

I, ______________________________, wish to participate in the SCUBA DIVING AND SNORKELING (Activity) offered by Walla Walla University (University). The term University as used in this agreement shall include Walla Walla University along with its officers, directors, agents, employees, successors, and assigns. As a precondition to participating in the Activity, I have read the following Liability Waiver, Assumption of Risk, and Release Agreement (Agreement) and agree to its terms.

1. Express Assumption of Risk. I understand that participating in the Activity entails inherent risks of physical injury, including, but not limited to, the risks described in the Activity Detail Form on the reverse side of the Agreement. I have been given the chance to ask questions concerning the Activity Detail Form, and all such questions have been answered to my satisfaction. Having read this form, I am fully aware of the risks and hazards associated with the Activity. Also, I understand and agree that situations may arise during the Activity which may be beyond the control of the leaders or participants. The risks include, by way of example and not limitation, accidents that may happen while traveling to the Activity locations. I VOLUNTARILY ASSUME ALL RISKS of loss, property damage, or personal injury including death, associated with participation in the Activity, unless caused by the gross negligence or willful misconduct of the University, its officers, trustees, agents, employees, or volunteers.

   I have read and understand the above. (Initial here) _____

2. Liability Release. In consideration for the University allowing me to participate in the Activity, I RELEASE, forever discharge, and agree not to sue THE UNIVERSITY FROM ANY LIABILITIES, CLAIMS, DEMANDS, ACTIONS, CAUSES OF ACTIONS, COSTS, AND EXPENSES OF ANY NATURE WHATSOEVER ARISING OUT OF ANY LOSS, DAMAGE, OR INJURY, INCLUDING DEATH THAT MAY BE SUSTAINED BY ME OR PROPERTY BELONGING TO ME, and arising from the Activity or while upon the premises where the Activity is being conducted, excepting those claims arising from the gross negligence or willful misconduct of the University. I hereby waive all claims which I have now or may hereafter have against the University in any connection with my participation in the Activity.

   I have read and understand the above. (Initial here) _____

3. Indemnification. I agree to indemnify and hold harmless the University from and against any loss, liability, damage, or costs, including court costs and attorneys’ fees, that the University may incur arising from my involvement in the Activity.

   I have read and understand the above. (Initial here) _____

4. Warranty of Physical Fitness. I agree that it is my sole responsibility to be familiar with the physical and/or mental demands associated with the above-named activity. With these demands in mind, I have no physical or medical condition which, to my knowledge, would endanger myself or others if I participate in this Activity, or would interfere with my ability to participate in this Activity. I maintain medical insurance that covers me for accidents and illnesses while I am participating in this Activity. I understand the University has not made, nor will make, any investigation into my physical fitness or ability to participate in the Activity, and the University is relying on my warranty of my physical condition.

   I have read and understand the above. (Initial here) _____

5. Emergency Medical Treatment. I grant the University permission to authorize emergency medical treatment, and agree that such action by the University shall be subject to the terms of this Agreement. I understand and agree that the University assumes no responsibility for any injury or damage that might arise out of or in connection with such authorized emergency medical treatment.

   I have read and understand the above. (Initial here) _____

It is further my express intent that this Agreement shall bind the members of my family and spouse (if any), my estate, heirs, administrators, assigns, and personal representatives. I agree that this Agreement and any claims from my participation in the Activity shall be construed in accordance with the laws of the State of Washington, without regard to its conflict of laws provision. The courts in Walla Walla County shall be the forum for any lawsuit arising from the Activity or incident to this Agreement. The terms of this Agreement shall be severable, such that if a court of competent jurisdiction holds any terms to be illegal or unenforceable, the validity of the remaining portions of this Agreement shall not be affected thereby.

It is further my express intent, in the event of any controversy or claim arising out of or relating to this agreement, that the first attempt to resolve the dispute shall be by mediation. If settlement is not reached within sixty days after service of a written demand for mediation, I understand that at that time I may proceed to address any unresolved controversy or claim through the court system. Unless otherwise agreed, the parties agree that the mediator shall be licensed to practice law in the State of Washington and will be mutually chosen by the parties. I further agree that the mediation shall take place in Walla Walla, Washington, unless otherwise mutually agreed. I understand that this agreement to mediate does not stay or otherwise halt the running of the applicable statute of limitations.

   I have read and understand the above. (Initial here) _____

I have carefully read both sides of this Agreement form and fully understand its contents. I agree to be bound by its terms. I am aware that this is a release of liability, a waiver of claims, an agreement not to sue, and a contract between myself and the University, and for the benefit of others described herein, I sign it of my own free will.

THIS IS A RELEASE OF LEGAL RIGHTS. READ AND UNDERSTAND BOTH SIDES BEFORE SIGNING.

PLEASE INITIAL WHERE INDICATED ON THIS PAGE, AND SIGN ON THE REVERSE SIDE OF THIS DOCUMENT.
ACTIVITY DETAIL FORM

Name of Activity/Class: ____________________________________________

SCUBA DIVING AND SNORKELING

Date(s) of Activity/Class: __________________________________________

Location of Activity/Class: _____ WWU Campus    Other: ______________________

Description of Activity/Class:

Scuba Diving and Snorkeling

ALL OCCUPANTS OF MOTOR BOATS AND THOSE WHITE WATER BOATING
(INCLUDING CANOES, KAYAKS, ROWBOATS, ETC.)
SHALL WEAR A COAST GUARD-APPROVED PERSONAL FLotation DEVICE AT ALL TIMES.

By participating in the above activity/class you may be exposed to several inherent risks, including but not limited to those listed below:

- Asphyxiation
- Breathing difficulties
- Broken bones
- Cardiac arrest
- Choking
- Death
- Dehydration
- Eye injuries
- Fainting, dizziness, or lightheadedness
- Head, neck, or back injuries
- Increased heart rate
- Injuries from other participants, objects, equipment, or vehicles
- Internal injuries
- Joint dislocations, sprains, stiffness, or soreness
- Muscle strains, stiffness, soreness, or cramps
- Pain or discomfort
- Puncture wounds
- Skin cuts, abrasions, or contusions
- Drowning
- Heat exhaustion
- Hypothermia
- Injuries from animal, insect, or plant exposure
- Injuries from weather exposure
- Sunburn

We request that you conduct your participation with the safety of yourself and others in mind.

THIS IS A RELEASE OF LEGAL RIGHTS. READ AND UNDERSTAND BOTH SIDES BEFORE SIGNING.

_________________________________________  ____________________________________________
Name of Participant (printed)                               Signature

_________________________________________  ____________________________________________
Date                   Age                             Signature of Guardian if 17 years old or younger
This Dive Plan has been developed for scientific divers to use in meeting the requirements of the *Walla Walla University Standards for Scientific Diving Manual*. This Dive Plan is applicable only to the scientific diving operations and scientific divers listed below. It is the responsibility of each participating scientific diver to be familiar and ensure compliance with the *Walla Walla University Standards for Scientific Diving Manual*.

**SCIENTIFIC DIVE PLAN APPLICATION**

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Leader</th>
<th>Today's Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of Dives</td>
<td>Dates of Dive Plan</td>
<td>Lead Diver(s)</td>
</tr>
<tr>
<td>Other Participating Divers</td>
<td>Estimated Number of Dive Days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum Number of Dives Per Day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum Dive Depth and Underwater Time</td>
<td></td>
</tr>
</tbody>
</table>

**Description of Dives** (scientific objectives, basic dive profile, peripheral equipment)

**Hazardous Conditions Anticipated**

**Location-Specific Scuba Emergency Action Plan:** to be included with this Dive Plan Application

**Diving Safety Officer Approval**

X ____________________________  Date _____________

DSO Comments:
APPENDIX 15
SCIENTIFIC DIVING ACCIDENT/INCIDENT REPORT FORM
**SCIENTIFIC DIVING ACCIDENT/INCIDENT REPORT FORM**

Notify Diving Safety Officer immediately after the incident occurs
Complete this form within 24 hours and submit it to the Diving Safety Officer

<table>
<thead>
<tr>
<th>Name: Last</th>
<th>First</th>
<th>MI.</th>
<th>Date of Birth</th>
<th>Social Security No.</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td>/ / /</td>
<td>- -</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Local Address:</th>
<th>City</th>
<th>State</th>
<th>Zip Code</th>
<th>Phone No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Permanent Address:</th>
<th>City</th>
<th>State</th>
<th>Zip Code</th>
<th>Phone No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current Status:</th>
<th>☐ Faculty /Staff</th>
<th>☐ Student</th>
<th>☐ Visiting Scientist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Academic Institution</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Your role in this incident:</th>
<th>☐ Scuba Diver</th>
<th>☐ Dive Buddy</th>
<th>☐ Boat Operator</th>
<th>☐ Witness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

Was this incident work-related? Did this incident occur while you were performing duties as an employee of Walla Walla University?

☐ Yes ☐ No

If YES, you must complete the WWU Work-Related Incident Report Form in addition to this Scuba Diving Incident Report Form within 24 hours. [https://www.wallawalla.edu/?id=1783](https://www.wallawalla.edu/?id=1783)

If NO, you must complete the WWU Non-Work-Related Incident Report Form in addition to this Scuba Diving Incident Report Form within 24 hours. [https://www.wallawalla.edu/?id=1783](https://www.wallawalla.edu/?id=1783)

<table>
<thead>
<tr>
<th>Location of Scuba Diving Incident:</th>
<th>Date &amp; Time of Incident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of Scuba Diving Incident:</td>
<td>Date &amp; Time of Incident</td>
</tr>
<tr>
<td></td>
<td>Month / Day / Year</td>
</tr>
<tr>
<td></td>
<td>a.m. / p.m.</td>
</tr>
</tbody>
</table>

**FULLY DESCRIBE INCIDENT:** If you fell, was it indoors or outdoors? If you were struck, name the object. Were you lifting, pulling, pushing or carrying? If machinery or equipment was involved, name and describe its function. Include names and roles of scuba divers, boat operators, and other people involved in or witness to the incident. Include dive profile and equipment used. Use extra pages if necessary.

<table>
<thead>
<tr>
<th>Nature of injury and part of body affected:</th>
<th>Example: Cut to my right index finger / Cough due to inhalation of water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you seek medical treatment?</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Check and circle all factors contributing to the incident.

☐ HUMAN
   Training
   Task performance
   Scuba history
   Panic

☐ SITE CONDITIONS
   Entanglement hazards
   Current
   Visibility
   Weather

☐ EQUIPMENT
   Scuba equipment
   Boating equipment
   Research equipment

☐ TIME FACTORS
   Length of dive
   Air availability
   Sequence of events

☐ POLICIES AND PROCEDURES
   Safety Policies and Procedures
   Operating specifications

Describe how these factors contributed to the incident (if not described previously)


Signature of Person Completing This Form: Date: Diving Safety Officer Signature: Date:

Diving Safety Officer will submit this form to the Diving Control Board chair and to Risk&Safety Management within 24 hours of receiving it. Diving Safety Officer will ensure that additional forms are completed and procedures are followed by the appropriate individuals as required by WWU and AAUS policies.

Diving Control Board Actions
EQUIPMENT INVENTORY AND MAINTENANCE SUMMARY

Diver ________________________________ Today’s Date ______________

“Service/Inspection Date” below refers to the most recent servicing or inspection.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Make/Model</th>
<th>Serial # (if applicable)</th>
<th>Service/Inspection Date</th>
<th>Service/Inspection Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulator – 1st Stage*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulator – 2nd Stage*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulator – Octopus*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Pressure Gauge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth Gauge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dive Computer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scuba Tank*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wet Suit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Suit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Suit Valves</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mask</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snorkel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight Belt System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated Weight System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underwater Timing Device</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Signaling Device</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Attach inspection/service forms from a certified service provider

Approved by DSO: ________________________________ Date: ______________

Comments:
APPENDIX 17
SCIENTIFIC DIVE FORM
**SCIENTIFIC DIVE FORM**

**INSTRUCTIONS:** Each diver must fill out this form before each dive, and complete the form upon completion of each dive. Each diver must be a currently-approved WWU Scientific Diver or Scientific Diver-In-Training. All dives using WWU equipment, facilities, or property must be for research or academic activities. No recreational diving is allowed.

| Your Name _____________________________ | Buddy’s Name _____________________________ |
| Lead Diver _____________________________ | Dive Date _____________________________ |
| Dive Location ___________________________ | Dive Objective ___________________________ |

<table>
<thead>
<tr>
<th>Departure Time _____</th>
<th>am</th>
<th>pm</th>
<th>Expected Return _____</th>
<th>am</th>
<th>pm</th>
<th>Actual Return _____</th>
<th>am</th>
<th>pm</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Planned Depth/Bottom Time _______ ft</th>
<th>_______ min</th>
<th>Actual Depth/Bottom Time _______ ft</th>
<th>_______ min</th>
</tr>
</thead>
</table>

- Shore Dive
- Boat Dive (complete Boat Trip Form)  
  Boat Operator _____________________________

<table>
<thead>
<tr>
<th>Tank Size</th>
<th>72</th>
<th>80</th>
<th>Other ______</th>
<th>Begin air ______ psi</th>
<th>End air ______ psi</th>
</tr>
</thead>
</table>

- Self Gear Check (prior to entry)
- Buddy Gear Check (prior to entry)
- First Aid Kit
- Emergency O₂
- Cell Phone
- VHF Radio
- Dive Flag
- Dive Table/Computer
- Surface Marker Buoy
- Location-Specific Emergency Action Plan

<table>
<thead>
<tr>
<th>Night Dive:</th>
<th>Primary Light</th>
<th>Secondary Light</th>
<th>Tank/Snorkel Light</th>
</tr>
</thead>
</table>

**AUTHORIZATION** (if not part of a current and approved Scientific Dive Plan)

Diving Safety Officer’s Signature _____________________________
APPENDIX 18
NITROX AUTHORIZATION FORM
Verification of training and certification is required for the use of any non-standard breathing mix for which the \( fO_2 \) is different than 21%.

<table>
<thead>
<tr>
<th>Name</th>
<th>Today's Date</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Nitrox Certification Agency</th>
<th>Nitrox Certification Date</th>
<th>Nitrox Certification #</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Estimated Number of Nitrox Dives</th>
<th>Date of Most Recent Nitrox Dive</th>
</tr>
</thead>
</table>

Please attach a copy of your Nitrox certification card or verification of training.

- Do you own Nitrox tables?  [ ] No [ ] Yes
- Do you own a Nitrox computer?  [ ] No [ ] Yes
- Do you own Nitrox tanks?  [ ] No [ ] Yes
- Do you own a Nitrox analyzer?  [ ] No [ ] Yes

Diving Safety Officer Approval

X______________________________ Date __________

DSO Comments:
Regulators and dive computers must be approved by the Diving Control Board (Section 3.00). The DCB approves the makes and models of regulators and dive computers produced by the scuba equipment manufacturers listed below. Makes and models produced by other scuba equipment manufacturers will require review and approval by the DCB on a case-by-case basis.

- Aeris
- Apeks
- Aqualung
- Atomic Aquatics
- Cressi
- Genesis
- Hollis
- Mares
- Oceanic
- Poseidon
- Scubapro
- Shearwater
- Sherwood
- Suunto
- Tusa
- XS Scuba
- Zeagle