

# 100' Depth Certification

When diving at deeper depths it is essential that all divers closely monitor their nitrogen limits displayed on their computer, plan their dive to begin ascending with enough air for the safety stops while surfacing with 500psi and be sure to be weighted properly for the dive. The increased pressure at deeper depths will cause divers to on-gas nitrogen and consume the gas in their cylinder at a fast rate and while the exposure suit will compress causing a diver to become negatively buoyant at depth.

100' scientific diver depth certification enables an active UCSB Scientific Diver to lead a dive to 100' and dive up to 130' when buddied with a researcher diver that has a 130' depth certification of greater. Requirements for a 100' depth certification includes:

1. Complete and log the **12 required dives** at a depth between the next certification depth range (60'-100') under direct supervision of a research diver holding at least a 100' certification.
2. Review pages 2-8 of this document 

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3. Complete the questions on **page 9** submit to the DSO ([eric.hessell@ehs.ucsb.edu](mailto:eric.hessell@ehs.ucsb.edu)).
4. Contact DSO concerning:
  - a. *Demonstrating proper use of computer (review dive log & plan dive features, changing battery techniques, change settings and set computer for Nitrox and pp O2) to DSO or designee.*
  - b. *100' Checkout-dive The diver must also demonstrate proficiency in the use of the appropriate decompression profiling method.*

# Scientific Dive Checklist

## PRIOR TO DIVE DAY

- ✓ **Dive Plan:** approved by DSO.
- ✓ **Diver Status**
  - Diver's status and depth certification checked on Webdiver.
- ✓ **Waivers/Work Comp. form**
  - UCSB Sci. Scuba Diving Waiver and any Work Comp. Volunteer forms completed by any non-UCSB employed diver.
- ✓ **Oxygen and First Aid:** available at dive site.
- ✓ **Shore Contact:** establish if needed.
- ✓ **Determining Decompression Status:** Ensure each diver has a dive computer or they are planning their dive with a Dive Table and has a timing device:
  - Dive Computers: *At no time should the remaining time No Deco Time displayed on the computers at depth be less than 10 minutes (5 min at depths 100 ft or greater).*
  - Dive Tables: *Diver without a computer must plan their dive with a dive table and record the dive details (max. depth, bottom time, time-in, time-out and the Letter Group) before and after each dive.*

## ON DIVE DAY

- ✓ **Conduct Pre-Dive briefing**
  - Review Dive Plan:
    - *dive objectives, buddy communication, specialized equipment, estimated max depth and bottom time, min. cylinder ending pressure prior to ascent, safety stop, slow ascent and surface with at least 500psi.*
  - Evaluate and discuss potential hazards:
    - *currents/surge/low visibility/boat traffic/fog/marine life/etc.*
- ✓ **Review Emergency Plan:**
  - Emergency Contact Procedures:
    - *VHS radio, cell phone, satellite phone, location (GPS if available).*
  - Low/Out-of-air procedures
  - Lost diver procedures
- ✓ **New Divers on Project**
  - Buoyancy Check: *divers new to the project should complete a buoyancy check on the surface*
  - Tasks: *limit any tasks for any new diver for your project until he/she is comfortable with the tasks/environment and you can gauge their comfort and abilities in the water first hand.*
- ✓ **Dive Flag:** Raise prior and lowered after a dive.
- ✓ **Dive Details:** Note dive details for Webdiver Entry

**Section 2.00**  
**Diving Regulations for SCUBA (OPEN CIRCUIT, COMPRESSED AIR)**

**2.10 INTRODUCTION**

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

**2.20 PRE-DIVE PROCEDURES**

**2.21 Dive Plan**

Dives should be planned around the competency of the least experienced diver. Before conducting any diving operations under the auspices of UCSB, the lead diver/dive manager for a proposed operation must formulate and submit a dive plan to the DSO prior to the project start. The dive plan form is available on-line: <http://ehs.ucsb.edu/dive>.

The dive plan should include the following:

- A. Divers' qualifications, and the type of certificate or certification held by each diver.
- B. Emergency plan with the following information:
  - 1. Name, telephone number, and relationship of person to be contacted for each diver in the event of an emergency.
  - 2. Nearest operational recompression chamber
  - 3. Nearest accessible hospital
  - 4. Available means of transport
- C. Approximate number of proposed dives.
- D. Location(s) of proposed dives.
- E. Estimated depth(s) and bottom time(s) anticipated.
- F. Decompression status and repetitive dive plans, if required.
- G. Proposed work, equipment, and boats to be employed.
- H. Any hazardous conditions anticipated.

**2.22 Pre-dive Safety Checks**

- A. Diver's Responsibility:
  - 1. Each scientific diver shall conduct a functional check of his/her diving equipment in the presence of the diving buddy or tender.
  - 2. It is the diver's responsibility and duty to refuse to dive if, in his/her judgment, conditions are unfavorable, or if he/she would be violating the precepts of his/her training, or UCSB diving manual.
  - 3. No dive team member shall be required to be exposed to hyperbaric conditions against his/her will.

4. No dive team member shall be permitted to dive for the duration of any known condition, which is likely to adversely affect the safety and health of the diver or other dive members.

**B. Equipment Evaluations**

1. Each diver shall ensure that his/her equipment is in proper working order and that the equipment is suitable for the type of diving operation.
2. Each diver shall have the capability of achieving and maintaining positive buoyancy.

**2.23 Emergency Procedures**

Scientific diving shall not be conducted unless the emergency plan information is complete and the dive plan has been reviewed by the DSO. The lead diver must ensure that first aid emergency and oxygen administration equipment is in working order and present at the dive location. A radio and/or cellular phone must also be present.

**2.30 DIVING PROCEDURES**

**2.31. Lead Diver/Diver-in Charge**

For each dive, one individual shall be designated as the lead diver. This person shall be at the dive location during the entire diving operation. The lead diver shall be responsible for:

- A. **Coordination.** Diving shall be coordinated with other known activities in the vicinity which are likely to affect diving operations. The lead diver is also responsible for suspending diving operations if in his/her opinion conditions are not safe.
- B. **Briefing.** The dive team members shall be briefed on:
  1. Dive objectives;
  2. Unusual hazards or environmental conditions likely to affect the safety of the diving operation;
  3. Modifications to diving or emergency procedures necessitated by the specific diving operation; and,
  4. Reporting any physical problems or adverse physiological effects, including symptoms of pressure related injuries.
- C. **Dive Planning.** Planning of a diving operation shall include considerations of the safety and health aspects of the divers.
  1. Diving mode;
  2. Surface and underwater conditions and hazards;
  3. Breathing gas supply;
  4. Thermal protection;
  5. Diving equipment;
  6. Dive team assignments;
  7. Residual inert gas status of dive team members;
  8. Decompression schedules and altitude corrections; and,
  9. Emergency procedures.
- D. **Emergency Equipment.** The lead diver must ensure that emergency equipment is present.

**2.32 Solo Diving Prohibition**

All diving conducted under the auspices of the UCSB shall be planned and executed in such a manner as to ensure that every diver maintains effective communication with at least one other comparably equipped, certified scientific diver. This buddy system is based upon mutual assistance, especially in the case of an emergency. Dives should be planned around

the competency of the least experienced diver. If loss of effective communication occurs within a buddy team, all divers shall surface and re-establish contact.

### **2.33 Termination of the Dive**

- A. It is the responsibility of the diver to terminate the dive, without fear of penalty, whenever he/she feels it is unsafe to continue the dive, unless it compromises the safety of another diver already in the water.
- B. The dive shall be terminated while there is still sufficient cylinder pressure to permit the diver to safely reach the surface, including decompression time, or to safely reach an additional air source at the decompression station.

### **2.34 Refusal to Dive**

- A. The decision to dive is that of the diver. A diver may refuse to dive, without fear of penalty, whenever he/she feels it is unsafe for them to make the dive.
- B. Safety - The ultimate responsibility for safety rests with the individual diver. It is the diver's responsibility and duty to refuse to dive if, in his/her judgment, conditions are unsafe or unfavorable, or if he/she would be violating the precepts of his/her training or the regulations in this manual.

### **2.35 Emergencies and Deviations from Regulations**

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

### **2.36 Enclosed or Confined Spaces**

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

### **2.37 Dive Flags**

An approved dive flag shall be displayed prominently over the dive site whenever diving is conducted.

### **2.38 Dive Computers and Dive Tables**

The use of dive computers or dive tables, as a means of determining decompression status is required for all dives conducted under the auspices of the UCSB. The use of dive computer must follow the AAUS recommendations on dive computers (Appendix 6 ).

### **2.39 Depth Limits**

- A. Each scientific diver shall be certified to a specific depth limit by the DSO.
- B. Each scientific diver diving under the auspices of the UCSB shall not exceed his/her depth certification, unless accompanied by a diver certified to a greater depth. Under these circumstances the diver may not exceed his/her depth limit by more than one step.

## **2.40 POST-DIVE PROCEDURES**

### **2.41 Post-Dive Safety Checks**

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

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

## **2.50 FLYING AFTER DIVING**

Divers should have a minimum surface interval of 18 hours (24 hours preferred) **before flying**.

## **2.60 RECORDKEEPING AND REQUIREMENTS**

### **2.61 Logging Dives**

Each certified scientific diver shall log every dive made under the auspices of the UCSB program, and is encouraged to log all other dives. Dives should be logged at least monthly into the UCSB on-line dive log database. Details of the submission procedures are left to the discretion of the Diving Safety Officer. The diving log shall be in a form specified by the Diving Safety Office and shall include at least the following:

- A. Name of diver, partner, and Lead Diver.
- B. Date, time, and location.
- C. Diving modes used.
- D. General nature of diving activities.
- E. Approximate surface and underwater conditions.
- F. Maximum depths, bottom time and surface interval time.
- G. Diving tables or computers used.
- H. Detailed report of any near or actual incidents. An incident is defined as, "An occurrence that interrupts normal procedure or brings about a crisis."

### **2.62 Record Maintenance**

It is the responsibility of the individual diver to maintain his/her active scientific diver status. The DSO or his/her designee shall maintain permanent records for each individual scientific diver certified. The file shall include evidence of certifications, log sheets, results of current physical examination, waivers, reports of disciplinary actions by the DCB, and other pertinent information deemed necessary.

### **2.63 Availability of Records**

- A. Medical records shall be available to the attending physician of a diver or former diver when released in writing by the diver.
- B. Records and documents required by this standard shall be retained by the DSO for the following period:
  - 1. Physician's written reports of medical examinations for dive team members -- 5 years;
  - 2. Manual for Diving Safety -- current document only;
  - 3. Records of dive -- 1 year, except 5 years where there has been an incident of pressure-related injury;
  - 4. Pressure-related injury assessment -- 5 years;
  - 5. Equipment inspection and testing records -- current entry or tag, or until equipment is withdrawn from service.

### **2.64 Required Incident Reporting**

All diving incidents requiring recompression treatment, or resulting in moderate or serious injury, or death shall be reported to the UCSB DCB within 24hrs. All close call (out-of-air, gear failure, etc) that could have resulted in an injury that would have required more than basic first aid should be reported to the DSO. UCSB's regular procedures for incident reporting, including those required by the AAUS shall be followed. The report will specify the

circumstances of the incident and the extent of any injuries or illnesses. Additional information must meet the following reporting requirements:

- A. UCSB shall record and report occupational injuries and illnesses in accordance with requirements of the appropriate Labor Code section.
- B. If pressure-related injuries are suspected, or if symptoms are evident, the following additional information shall be recorded and retained by UCSB, with the record of the dive, for a period of 5 years:
  1. Complete UCSB Incident Report Form (Appendix 6 ).
  2. Written descriptive report to include:
    - a) Name, address, and phone numbers of the principal parties involved.
    - b) Summary of experience of divers involved.
    - c) Location, description of dive sites and description of conditions that led up to incident.
    - d) Description of symptoms, including depth and time of onset.
    - e) Description and results of treatment.
    - f) Disposition of case.
    - g) Recommendations to avoid repetition of incident.
- C. The DCB shall investigate and document any incident of pressure-related injury and prepare a report, which is to be forwarded to the AAUS during the annual reporting cycle. This report must first be reviewed and released by the UCSB DCB.

## Adding A Deep Stop

Decompression Illness (DCI) is unpredictable and can occur after any dive. Divers must take responsibility for themselves and dive conservatively to lessen the chances of DCI occurring. Though Doppler studies have suggested that SCUBA divers probably experience asymptomatic bubbles following every dive, these bubbles are considered minor and alone will not cause DCI. DCI can occur upon surfacing when the ambient pressure surrounding the body is reduced too quickly. Once this occurs gas elimination from the diver is reduced and the DCI cycle begins.

Making a safety-stop at 15-20 ft for 3-5 minutes and maintaining a slow ascent rate of 20-30ft/min after every recreational dive are two of the recommended steps to take upon ascending to decrease the risk of DCI. *Making a safety stop assists the body in rapidly eliminating nitrogen.* This is accomplished by allowing the nitrogen to remain dissolved in the body when being eliminated from the diver, decreasing the likelihood of bubbles forming.

DAN studies have confirmed that repetitive and deeper dives are related to the increased presence of bubbles in the blood following a dive. Studies have also been addressing how a diver could decrease the presence of asymptomatic bubbling, thus lessening the risk of acquiring DCI upon ascending. So what precautions are currently being recommended during an ascent from a deeper (>40ft) dive?

The first two precautions recommended during an ascent from a deeper dive have already been reviewed: maintain a slow (20-30ft/min) ascent rate and perform a "safety stop" at 15-20ft for 3-5 minutes. A third precaution during ascent currently being recommended entails breaking up the current linear ascent into stages by adding short, deep stops. Added deep stops during ascent will not only slow a divers total ascent rates, but may also help further decrease the risk of DCI.

Deep stops have long been used to benefit divers performing "*decompression dives.*" A study by DAN strongly supports the idea that the addition of "deep stops" to a recreational dive may decrease the amount of bubbling in the body. DAN suggested that a deep stop at half the depth of the dive "*should reduce the critical fast tissue gas tensions and help reduce the incidence of decompression sickness.*" Simply put, a quick deep stop may provide time for the body to decrease the amount of nitrogen in the tissues at a reduced pressure before further reducing the pressure (ascending). The recommended length of time for a deep stop is not very long, 1-2 minutes, and this added step may significantly assist with the elimination of nitrogen acquired from deeper dives (>40ft).

### Recommendations During Ascents:

- *Maintain a slow ascent rate (20-30ft/min)*
- *Make a safety stop at 15-20ft for 3-5min after every dive*
- *For Deeper Dives (>40ft), add a stop (1-2 min) during your ascent at half the depth of the dive*

For more details about Deep Stops please refer to the following articles:

"Ascending From a Dive" by Brian Morris

"Deep Stops" by B.R. Wienke

"Deco: The Good, the Bad, and the Bubbly" by  
Barbara Kross, Ph.D

"The Rule of Halves" by Bruce R. Weinke, Ph.D. and  
Timothy R O'Leary.



## 100 'Depth Certification - DCS Review

1. Why is it required to not have the No Deco time remaining on your computer no less than 10 min (5min for dive >100ft)? Why is a slow ascent and precautionary stop at 15-'20' for 3-5 min recommended during every ascent? What is a deep stop?

2. List a minimum of 10 Signs or Symptoms of DCS.

3. List a minimum of 10 ways to reduce the risk of DCS during your dives.

4. Describe your response if you or someone else shows signs or symptoms of DCS  
*Include basic first aid along with the name and number of the local treatment chamber*

Please E-Mail or send the completed form to the UCSB Diving Safety Office