

UNSW Australia

SCUBA DIVING OPERATIONS MANUAL

This is a working document and subject to change

UNSW Australia Diving Safety Committee

December 2013

Based on the version prepared by the working party
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Reviewed: Dec 2013

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1 INTRODUCTION

The University of New South Wales conducts Scientific Diving as a tool for teaching and scientific research.

The University of New South Wales acknowledges its responsibilities under the NSW *Work Health and Safety Act 2011*. **All scientific diving operations will be conducted according to AS/NZS 2299.2, the Work Health and Safety Regulation 2011 (WHS Regulation 2011) and the Work Health and Safety Regulation 2011 Exemption No. 009/12 (WHS Exemption).**

The purpose of the Scuba Diving Operations Manual is to ensure compliance with AS/NZS 2299.2 and WHS Regulation 2011, and to define roles and responsibilities in diving operations at The University of New South Wales. The University of New South Wales uses this manual to manage its obligations by identifying hazards, removing any associated risks and/or implementing risk controls to prevent or minimize the level of risk to the employees, students, visitors, contractors, and volunteers engaged in underwater diving at the workplace. Employees, students, visitors, contractors and volunteers have responsibilities and obligations that are also identified in this manual.

This Scuba Diving Operations Manual will address and assist the planning and implementation of safe diving practices by identifying hazards, limitations and responsibilities of each member of the dive team through to administrative levels of management for all aspects of diving within The University of New South Wales. The Scuba Diving Operations Manual will be reviewed both periodically and as required.

This document outlines the procedures for conducting diving operations using compressed air, for scientific research or educational purposes under the auspices of The University of New South Wales.

Although this manual is primarily aimed at scientific diving conducted by employees and students of the University, it also sets out the procedures that are to apply when the University of New South Wales engages contractors to perform either scientific diving (under AS/NZS 2299.2) or occupational diving (under AS/NZS 2299.1).

Users of this manual should note the usage of the following terms:

must / shall : there are no circumstances under which this instruction may be ignored

should : normal diving practice requires that this instruction be obeyed but there may be circumstances in which it is appropriate for it to be relaxed

can / may : scientific diving may well benefit from using this technique

should consider : a helpful hint for scientific divers

1.1 REFERENCED DOCUMENTS

The following publications are referred to in this manual.

- AS/NZS 2299.1:2007 Standard operational practice
- AS/NZS 2299.2:2002 Scientific diving
- AS 2815.1:2008 Training and certification of occupational divers Part 1: SCUBA diving to

30m (latest publication)

- AS 4005.2:2000 Training and certification of recreational divers – Recreational SCUBA dive supervisor
- Work Health and Safety Regulation 2011 (NSW)
- Work Health and Safety Regulation 2011 Exemption No. 009/12
- HS801 UNSW Contractor Safety Management Guideline

This document should be read in conjunction with the University's Fieldwork Safety Guideline [http://www.ohs.unsw.edu.au/hs_procedures_forms/guidelines/HS406_UNSW_Fieldwork_Guidelines.pdf], as they cover more general aspects of fieldwork that must also be taken into account when planning and carrying out scientific diving.

Copies of these and other referenced documents are available for reference from the Diving Officer.

2 DEFINITIONS

Bottom time – the total time elapsed from when a diver leaves the surface to the time (next whole minute) at which ascent is commenced, measured in minutes.

Breathing gas – the compressed gas intended for respiration by the diver.

Buddy system – a system in SCUBA diving operations whereby a team of two or three free-swimming divers communicate through visual or other means in order that they can help each other.

NOTE: Generally, one member of the team is nominated, and agreed to as the leader and controller of the actions of the team.

Caisson gauge – a pressure gauge specifically designed for the use inside pressure vessels.

Competent person – a person who has acquired, through training, qualifications or experience (or a combination of these), the knowledge and skills enabling that person to safely perform a specified task.

Compression (recompression) chamber (RCC) – a surface chamber in which a persons may be subjected to pressures equivalent to or greater than those experienced when under water, or under conditions which simulate those experienced on an actual dive.

Decompression illness – a generic term for acute illness resulting when pathological consequences arise from decompression. This term covers the condition known as decompression sickness (also known as bends) and arterial gas embolism, but does not include barotraumas of ascent.

Decompression schedule - a specific decompression procedure for a given combination of depth and bottom time as listed in a decompression table; it is normally described in terms of maximum depth (MSW) and bottom time (minutes).

Decompression stop - the specific length of time that a diver must hold their ascent at a specified depth to allow for the elimination of sufficient inert gas from the body to allow a safe ascent to the next decompression stop or the surface.

Demand gas supply device – a device that provided breathing gas to the diver via a mechanism which provides a flow of breathing gas when the diver inhales.

Dive coordinating position – a single, designated location on the surface, adjacent to where a diver enters the water, from which the diver's safety is monitored.

Dive coordinator – a person who supervises and coordinates any dive and is responsible for the dive team safety.

Dive leader – a person in charge of a specific part of a diving operation.

Dive plan – a procedure specific to a given diving operation.

Diver – a person who performs diving work underwater and who, for the purposes of this Diving Operations Manual, is trained and experienced in accordance with one of the categories mentioned within.

Diving officer – a person who has been nominated in writing by the employer and is ultimately responsible for all diving activities.

Diving program – one or more dives that are related by purpose, place or time to form a series.

Diving team – divers and support personnel operating together.

Diving work – work in which diving is conducted using underwater breathing apparatus, including work by the dive team in direct support of the diver.

Effective Bottom Time (EBT) – for a diver carrying out repetitive diving, the bottom time calculated after taking into consideration the residual nitrogen from previous dives.

Effective depth – for a dive at altitude, the depth of an equivalent dive at sea level.

Exceptional exposure dive – a dive where the maximum recommended dive time for a particular depth (shown by the limiting line in decompression tables) is exceeded by a diver at that depth.

Float line – a buoyant line connecting the diver to a highly visible float on the surface of the water enabling the approximate location of the diver to be known at all times.

Lazy shot – a rope running from the surface (dive coordinating position) to an attached weight, hanging free and positioned off the bottom or worksite. The rope is marked with depth graduations to facilitate decompression stops at the correct depth.

Lifeline – a line attached to a diver which is capable of being used to haul the diver to the surface.

Limiting line – a line shown in some decompression tables, which indicates time limits (bottom times) beyond which decompression schedules are less safe.

Multi-place compression chamber – a hyperbaric chamber designed for occupancy by more

than one person at a time.

Occupational diving – diving performed in the course of employment (irrespective of whether or not diving is the principle function of employment or merely an adjunct to it) and comprising all diving carried out –

- as part of a business;
- as a service;
- for research; or
- for profit.

Quick release mechanism – a readily operated mechanism that enables the immediate release, e.g. of diver's equipment, from the secured position by a single operation of one hand, but which is designed to minimize the risk of accidental release.

Repetitive dive – any dive conducted within 18 h of a previous dive or that has a repetitive factor greater than 1.0 when calculated using DCIEM tables.

Repetitive factor – for DCIEM tables, a figure determined by the repetitive dive group and the length of the surface interval after a dive and used for repetitive diving.

Reserve air supply – that quantity of air that will enable a diver to return safely to the surface from the planned depth of the dive, completing any planned decompression stops.

Residual nitrogen – nitrogen that is still dissolved in a diver's body tissues after the diver has surfaced.

Saturation – that condition where the person's body tissues are totally saturated with the particular inert element of the breathing medium.

Scientific diving – diving performed for the purpose of professional scientific research, natural resource management or scientific research as an educational activity.

Self-contained underwater breathing apparatus (SCUBA) – open-circuit diving equipment which supplies the wearer with breathing gas from cylinders carried by the wearer.

Shot rope – a rope running from the surface (dive coordinating position) and fixed to the worksite or bottom with a weight or attachment. The rope is marked with depth graduations to facilitate decompression stops at the correct depth.

Surface Interval (SI) – the time which a diver has spent on the surface following a dive, beginning as soon as the diver surfaces and ending upon commencement of the diver's next descent.

Surface-supplied breathing apparatus (SSBA) – diving equipment that supplies breathing gas at the required pressure for the depth, through a diver's hose to a diver from plant at the surface.

Tethered mode (in relation to SCUBA diving) – SCUBA diving in which a diver is secured by a lifeline and tended by a diver's attendant, or is secured to a tended float line.

Therapeutic recompression tables – tables used for the treatment of decompression injury and

other pressure-related injuries.

Visiting scientific diver – a trained, certified visiting diver from another country who performs tasks relevant to scientific diving in his or her own country, who has a current diving medical certification and who is allowed to dive under this Standard during his or her visit.

3 PERSONNEL & RESPONSIBILITIES

3.1 EMPLOYER

The University shall:

- Appoint and consider recommendations made by the Scientific Diving Advisory Committee.
- Periodically review the management process regarding diving practices under their responsibility.
- Appoint Diving Officer(s) with the responsibilities as set out under 3.3.
- Implement a management process to ensure that all scuba diving activities performed by staff, students, contractors, volunteers and visitors under the auspices of The University of New South Wales comply with AS 2299.2 Scientific diving, Work Health & Safety Act 2011, WHS Regulation 2011, Work Health and Safety Regulation 2011 Exemption No. 009/12 and this Diving Operations Manual (when within its scope) and allocate necessary resources where applicable.
- If using contractors, adhere to the HS801 UNSW Contractor Safety Management Guideline.
- If using contractors ensure the contractor complies with the WHS Regulation 2011 (including obtaining the documentation referred to in section 3.6.4 below) and the Australian standard relevant to their work (AS/NZS 2299.1 Standard operational practice and/or AS 2299.2 Scientific diving).

3.2 SCIENTIFIC DIVING ADVISORY COMMITTEE

The University of New South Wales shall select and appoint a Scientific Diving Advisory Committee.

The Scientific Diving Advisory Committee should:

- review relevant legislation
- periodically review the scientific diving operations manual
- provide information, guidance and advice to Directors, Heads of Schools, Supervisors, principal researchers, employees, staff, students and visitors regarding diving policy and practice, recommend and disseminate modifications of policy and practice to all levels of University management, staff, students and visitors.

3.3 DIVING OFFICER

The University of New South Wales shall appoint Diving Officer(s) who shall be experienced Scientific Diver(s) trained to a level equal to or exceeding that specified in AS2815.1 (Commercial Diver) and have a certificate to that effect issued by a relevant authority. They shall have at least 100 h of underwater diving experience and satisfy any other reasonable requirements as specified by the organization. The responsibilities of the Diving Officer are described in AS/NZ 2299.2 and WHS Regulation 2011. The Diving Officer shall:

- (a) Have the power to restrict, prohibit or suspend any diving operations, program or practice which he or she considers unsafe;
- (b) Have the power to require such additional safety practices, procedures or equipment as he or she thinks necessary in any diving operation;
- (c) Assess diver's competencies and record the evidence used in the assessment;
- (d) Be familiar with any legislation and guidelines which may apply to the diving operations, including AS/NZ 2299.2 and WHS Regulation 2011, the WHS Exemption, this manual and ensure that any dive proposals that he/she approves comply with the requirements of this manual.

When approving dive proposals, The University of New South Wales Diving Officer(s) shall ensure that the divers are trained and competent for the diving operation proposed, and have any extra training they may require prior to particular dives. The Diving Officer(s) may authorize a diver to dive on certain diving operations only, depending on the qualifications of the diver and relevant legislative requirements. When approving dive proposals the Diving Officer(s) will also consider the adequacy of the risk assessment and emergency plan for each dive proposal.

3.4 DIVE COORDINATOR

A dive coordinator appointed by the diving officer shall be present at all times while a diver is in the water or under pressure in a compression chamber. The dive coordinator shall be responsible for the safe conduct of diving and shall coordinate and direct the activity of the diving teams and ensure that all diving is carried out in accordance with AS/NZ2299.2 and the WHS Regulation 2011.

A dive coordinator shall have at least 15 hours experience as a Scientific scuba diver and have experience in the diving, equipment and procedures used in the diving operation to be performed. They shall further:

- (a) Be appointed in writing at the discretion of the diving officer to supervise diving operations; and
- (b) Be able to recognize and manage diving emergencies and conduct pre-dive risk assessments
- (c) Satisfy any other reasonable requirements specified by the organization's Diving Officer.
- (d) Be familiar with this manual and ensure diving operations are carried out in accordance with its requirements

3.5 DIVE LEADER

A dive leader is a person in charge of a specific part of a diving operation. A dive leader shall be-

- (a) The dive coordinator or a person appointed by the dive coordinator; or
- (b) A scientific diver or a visiting scientific diver with adequate knowledge and experience of the diving techniques and equipment to be used.

When a dive leader is the person in charge of a single group of divers who are diving in free-swimming SCUBA mode, that person shall take responsibility for any decisions required as the dive proceeds, in consultation with the dive coordinator where appropriate.

3.6 CLASSIFICATION AND COMPETENCY OF DIVERS

Every diver shall be classified as a restricted scientific diver, a scientific diver, visiting scientific diver or a visiting restricted scientific diver. All divers shall be made aware of their occupational health and safety responsibilities and the organization's relevant procedures, including this manual.

3.6.1 Scientific Scuba Diver

In order to carry out scientific diving using scuba a scientific diver shall have:

1. a) A statement of attainment for a specified VET course for general diving work that includes the type of general diving work to be carried out by the person, **or**
 - b) A certificate for general diving work, issued by a training organisation that mentions the subject areas covered in AS/NZS4005.2 (*Training and certification of recreational divers – Recreational SCUBA dive supervisor*).
2. All divers must have, through training, qualification or experience, acquired sound knowledge and skill in relation to the following:
 - a) The application of diving physics,
 - b) The use, inspection and maintenance of diving equipment (including emergency equipment) and air supply of the type to be used in the proposed general diving work,
 - c) The use of decompression tables or dive computers,
 - d) Dive planning,
 - e) Ways of communicating with another diver and with persons at the surface during general diving work,
 - f) How to safely carry out general diving work of the type proposed to be carried out,
 - g) Diving physiology and first aid, and
3. Have at least 15 hours of underwater diving experience after certification, and
4. Demonstrate competency and satisfactory performance in diving theory and diving practical units as specified in AS/NZ 2299.2, and
5. Be familiar with the pre-dive plan before diving, and
6. Dive in accordance with the pre-dive plan, and
7. Act as a buddy diver during the dive to others in his or her designated buddy group, unless diving alone in tethered SCUBA mode. Free-swimming buddy divers shall maintain effective two-way communication with each other at all times while in the water and be able to render assistance, and
8. Be on the Dive Register of his/her institution with a current diving medical, and
9. Abide by the procedures for diving as described in AS/NZS 2299.2, Work Health and Safety Regulation 2011 and this manual.

3.6.2 Restricted Scientific Diver

This category is specifically for persons who are involved in research requiring diving but who have limited diving experience and are deemed by the diving officer of their host institution not to have experience equivalent to a scientific diver.

As a minimum, a restricted scientific diver shall-

1. Be 18 years of age,
2. Shall have:
 - a) A statement of attainment for a specified VET course for general diving work that includes the type of general diving work to be carried out by the person, **or**
 - b) A certificate for general diving work, issued by a training organisation that mentions the subject areas covered in AS4005.2 (*Training and certification of recreational divers – Recreational SCUBA dive supervisor*), and
3. All divers must have, through training, qualification or experience, acquired sound knowledge and skill in relation to the following:
 - a) The application of diving physics,
 - b) The use, inspection and maintenance of diving equipment (including emergency equipment) and air supply of the type to be used in the proposed general diving work,
 - c) The use of decompression tables or dive computers,
 - d) Dive planning,
 - e) Ways of communicating with another diver and with persons at the surface during general diving work,
 - f) How to safely carry out general diving work of the type proposed to be carried out,
 - g) Diving physiology and first aid, and
4. Have at least 15 hours of underwater diving experience after certification, and
5. Only dive when conditions are suitable for untethered SCUBA mode, and
6. Not dive deeper than 18 m depth, and
7. Not act as a standby diver or a dive leader, and
8. Not use powered tools or lift bags.

3.6.3 Visiting Scientific Diver and Visiting Restricted Scientific Diver (Limited Scientific Diving)

1. A person who is not permanently resident in Australia must not carry out limited scientific diving work unless the person has:
 - a) The training qualification or experience referred to in clause 3.6.1 (c), and
 - b) Relevant diving experience, including relevant diving experience obtained outside Australia.

2. In this clause, a person has **relevant diving experience** if the person has logged at least 60 hours of which at least 8 hours and 20 minutes were spent diving between 10 meters above and any depth below the maximum depth at which the limited scientific diving work is to be carried out.

3.6.4 Contractors

This category is for contracted divers who are employed by UNSW to carry out diving work. Each diver shall:

1. Hold a certification relevant to the type of work being carried out. This certification must comply with the Work Health and Safety Regulation 2011.
2. Be on the Dive Register of their home organisation.
3. Abide by the procedures for diving as described in the Work Health and Safety Regulation 2011 and the Australian Standard relevant to the type of work to be carried out (AS/NZS 2299.1 or AS/NZS 2299.2 as applicable).

When engaging contractors for diving, the requirements in the UNSW Contractor Safety Management Guideline (HS801) must be followed. This is to assess that the contractor has a Health and Safety Management System in place to ensure the health and safety of persons involved in the activity and others who may be affected by it. The guideline requires certain documentation from the contractor to be obtained prior to the work. See Appendix A.

Note: Contractors may be employed to dive between 30 and 50 meters according to AS/NZS 2299.1 procedures if they have the relevant certifications and experience, and the appropriate risk assessment and mitigation is carried out. They must use decompression tables mentioned in AS/NZS 2299.1 or ANZS/2299.2.

3.6.5 Students and volunteers diving under the Work Health and Safety Regulation 2011 Exemption No. 009/12 (Appendix B)

The exemption only covers enrolled honours and post graduate university students and associated volunteers. These students and volunteers are exempt from the requirements of Clause 171 of the WHS Regulation 2011 that specifies the competencies required. The students and volunteers must comply with AS/NZS 2299.2 in particular, the qualifications and practices of Appendix A4 and A4.3 Restrictions (Restricted Scientific diver) at all times. They shall:

1. be at least 18 years of age, and
2. hold an open water certificate from a recognised SCUBA training and certifying organisation, and
3. have at least 15 hours of underwater diving experience after certification, and
4. not dive using SSBA equipment unless trained in SSBA diving, and
5. only dive when conditions are suitable for untethered SCUBA mode, and
6. not dive deeper than 18 m depth, and
7. not act as a standby diver or a dive leader, and
8. not use powered tools or lift bags.

3.7 DIVER'S ATTENDANT

3.7.1 Availability and knowledge

Dive teams shall have a diver's attendant who is competent to administer cardiopulmonary resuscitation (CPR) and oxygen resuscitation and have a working knowledge of the following:

- (a) Diving and the requirements of underwater work.
- (b) Signals in use, in particular, the systems of hand and rope signals to be used in the diving operations.
- (c) Decompression procedures.
- (d) Diving equipment in use, including ancillary fittings such as pressure gauges, compressors and filters.

The diver's attendant shall not be engaged in any task other than that of diver's attendant while the dive team is in the water or under pressure.

3.7.2 Duties

The diver's attendant, or other person nominated by the dive coordinator, shall-

- (a) Record the time of descent and surfacing of each diver;
- (b) Maintain a constant vigil during a dive for divers surfacing at a distance from the boat or other dive control position;
 - 1. Assist in the recovery of divers and all equipment and samples from the water;
 - 2. Ensure that the dive flag is deployed
 - 3. If tending a diver's lifeline, maintain the ability to communicate with the diver by means of that lifeline.

3.8 STANDBY DIVER

3.8.1 General

The standby diver shall be present whenever a single diver is underwater in tethered mode, and shall be a qualified diver and located on the surface, dressed and equipped to enable immediate entry into the water for the purpose of providing aid or assistance to a distressed diver. The dive profile of the standby diver shall be planned to allow all necessary assistance to be given to a distressed diver without the standby diver incurring a decompression commitment. The only exceptions to this shall be:

- a) In an emergency; or
- b) When the depth of the water is such that the standby diver will automatically incur a decompression commitment.

NOTE: The surface standby diver may perform certain minor duties (e.g. tending the lifeline) provided the safety of the diver in the water is not compromised in any way.

3.8.2 Two divers in the water

Where two divers are in the water at the same time, one may act as standby diver for the other provided that both divers have no decompression commitment and maintain visual contact with, and direct access to, each other. That is, the buddy diver may act as the standby diver.

3.9 HEALTH, FITNESS AND FIRST AID

3.9.1 Health and fitness

All divers must be certified as medically fit to dive in accordance with the requirements of AS/NZS 2299.1 (see Appendix L for a comprehensive list of Medical Practitioners within the Sydney Metropolitan area, trained specifically to perform Occupational Diving Medicals). A certificate of fitness to dive shall have been issued within 12 months prior to diving by a medical practitioner appropriately trained in underwater medicine. All divers involved in diving shall also ensure that they are fit to dive. Fitness should be maintained by exercise and regular diving. Where a diver has not dived for a period of time exceeding six months, the diver shall carry out a check out dive or program of dives with the diving officer or the diving officer's delegate qualified to undertake such an evaluation.

3.9.2 First Aid for Diving Teams

All divers and attendants should be trained in first aid so that, as a minimum, they are able to-

- (a) Control bleeding;
- (b) Administer 100% oxygen to spontaneously breathing patients and oxygen-enriched resuscitation to non-breathing patients using the oxygen resuscitation equipment at the dive site;
- (c) Care for an unconscious patient; and
- (d) Carry out cardiopulmonary resuscitation.

NOTES:

1. The above requirements are usually met by a first aid course leading to certification, incorporating or supplemented by an oxygen administration course.
2. It may in some circumstances be possible to make adequate provision for the delivery of emergency first aid with not all personnel being trained, provided that no less than two persons are trained and available to ensure first aid will be available if required.

4 ORGANISATION, PLANNING AND RECORDS

4.1 GENERAL

Diving procedures must be carried out according to the provisions of AS/NZS 2299.2, WHS Regulation 2011 and this manual. Many scientific locations are remote from search and rescue, medical and recompression facilities and risk assessment and planning must take this into account.

4.2 ACTION PLAN

All diving must be in accordance with the following action plan. More detailed guidance on the processes of hazard identification, risk assessment and risk control can be found in Appendix C. Documentation of these processes should be carried out using the forms referred to in Appendices B and C as a minimum.

4.2.1 Diver Registration – see Appendix D

All staff, students, visitors and volunteers who are required to scuba dive in diving operations conducted by The University of New South Wales must register and be approved for diving by the Diving Officer. Each diver will be approved as a scientific diver, a restricted scientific diver, visiting scientific diver or a visiting restricted scientific diver. All contractors must be registered at their own organisation.

4.2.2 Dive Proposal – see Appendix E

The Dive Proposal must be approved by the Diving Officer before every diving operation. It comprises a dive proposal, risk assessment and emergency plan.

- (a) Dive Proposal - details of location of diving operations and dive team
- (b) Risk Assessment - identify possible hazards and precautions to be taken
- (c) Emergency Plan - identify emergency facilities and procedures

4.2.3 On Site Pre-Dive Plan and Risk Assessment – see Appendix F

At the dive site before every dive, the dive coordinator, divers, divers' attendants and any non-diving support personnel shall discuss in detail and agree upon the pre-dive plan and update the risk assessment. The On Site Pre-Dive Plan and Risk Assessment must be lodged with the Diving Officer on return to The University of New South Wales.

4.2.4 Dive Log– see Appendix G

At the completion of each dive, the return of each diver shall be verified by the diver and the dive coordinator, as soon as practicable after return. If diving from a vessel the return of the diver must be verified before the vessel leaves the location.

4.2.5 Diver's Record and Employer's Record of Dives

All divers shall keep and maintain a permanent record of all diving undertaken for the duration of the diver's working life. At the end of a diving operation the Dive Coordinator shall deposit with the Diving Officer, a copy of each diver's log for dives conducted during that diving operation.

The diver's permanent record of diving usually takes the form of a logbook, which shall include:

- a) The diver's photograph
- b) Next of kin information
- c) Diver's name, current address, date of birth and signature
- d) A record of medical examinations conducted for the purpose of scientific diving;
- e) A record of diving activity undertaken and,

- f) A record of accidents and incidents including decompression treatment(s).

The logbook shall be presented at each diving medical examination. The diver's record of dive (including a brief summary of any incidents or accidents) should be entered into this permanent record of diving at the completion of each dive, and signed by the Dive Coordinator for verification.

4.3 DIVING PROCEDURES

4.3.1 Restrictions on diving operations

Diving operations shall only be carried out when:

- The dive does not involve planned decompression stops
- The maximum depth does not exceed 30 metres
- The dive does not involve "Cave diving" as defined by the Cave Diving Association of Australia (<http://www.cavedivers.com.au/>)

4.3.2 Dive Teams

Dive teams must include a Dive Coordinator and should comprise

- Two divers and a competent boat person or shore watch (diver's attendant) OR
- Three divers and a competent boat person or shore watch (diver's attendant) OR
- More than three divers grouped into buddy pairs (preferably) or trios, but no more, and one competent boat person or shore watch (diver's attendant) OR
- When diving in "Sheltered conditions", divers are permitted to dive without a shore watch (i.e. in a team of two divers).

Note: Sheltered conditions are defined as:

- 1. Depth less than 12 metres,**
- 2. Visibility greater than 4 metres,**
- 3. Wave height less than 1 metre,**
- 4. Current nil to slight,**
- 5. Third party assistance is readily available in an emergency,**
- 6. Daylight hours, and**
- 7. Carry a surface marker buoy whilst at pressure.**

4.3.3 Dive Leader

Before the divers enter the water, one member of each group of divers shall be designated by the Dive Coordinator as the underwater dive leader of that group. Prior to the dive, the Dive Leader should confirm the means to be used by the group for summoning attention and recalling divers to the surface, such as banging on the tank with the knife. The Dive Leader should also confirm that any diver feeling distressed or uncomfortable may terminate the dive at any time.

4.3.4 Night dives

In addition to normal diving procedures, the following procedures must be followed for a night dive:

- The entry and exit points shall be adequately and distinctively illuminated
- Every diver shall carry at least two lights, one of which may be a chemically-activated light stick.

Consideration should be given to the use of other safety measures according to circumstances.

4.3.5 Blue water diving

Blue water diving activities may be carried out with special consideration from the Dive Safety Committee.

4.3.6 Use of decompression tables

All dives including repetitive dives must be calculated using DCIEM tables (Canadian Defense and Civil Institute for Environmental Medicine). A copy of the DCIEM tables can be viewed at: <http://www.bees.unsw.edu.au/sites/default/files/DCIEM%20Tables.pdf>. Divers should note that UDT, the licensee and manufacturer of DCIEM tables have recommended amendments covering the use of these tables (see Appendix H).

Maximum bottom times and pressure groups must be reduced according to Table 4.1 and 4.2 of AS/NZS 2299.1 if diving is conducted without a recompression chamber on site (see Appendix H). Dive computers may be used for the diver's own information.

4.3.7 Safety stop

On each dive, divers should do a safety stop of at least 3-5 min at 3m.

4.3.8 Diving with other institutions and divers from other institutions

When a dive operation is conducted by The University of New South Wales all divers must be registered with The University of New South Wales and follow the procedures of AS/NZS 2299.2, WHS Regulation 2011 and this manual.

When The University of New South Wales divers participate in diving operations conducted by another institution, they must follow the procedures of AS/NZS 2299.2, WHS Regulation 2011 this manual and the procedures of the institution conducting the diving operation.

4.3.9 Incident Reporting

All incidents, unexpected hazards, accidents and injuries will be reported as soon as possible the Diving Officer and to the Risk Management Office as soon as possible.

Where injuries occur or there are mechanical breakdowns or accidents that affect completion of the work, safe return of staff or students, or endanger life, these must be reported verbally as soon as practical to the contacts at the University. Less serious events shall be reported to the Diving Officer on return to the University. Refer to the University Emergency Action Plan – see Appendix I. The DAN incident report forms should be kept at the dive site and can be used to assist with incidents in the field. . See Appendix J

All injuries, illnesses and incidents must be reported through the University's online reporting system Harm to Zero. This can be found at <http://www.my.unsw.edu.au> – H20 – Harm to Zero.

The Dive Coordinator and Dive Officer must investigate all incidents, hazards, injuries and breakdowns with the other people involved to determine the causes and any actions that may be taken to prevent a recurrence of the incident. Detailed guidance on the investigation of accidents and incidents can be found in Section 7 of AS/NZS 2299.2:2002.

If an event occurs which affects work or future work, a debriefing must be held soon after the return of the dive team, in accordance with procedures developed by the Department. The debriefing should cover issues such as the adequacy of the planning, risk assessment and preparation for the dive, any incidents which occurred and how they were managed and any lessons learned that could benefit future dives by members of the Department concerned or

other Departments.

4.3.10 Lost Diver Routine

In the unlikely event that a diver becomes separated from their buddy:

- The divers will do a 360° search for each other for a maximum of 1 minute looking for bubbles or visual sign of lost diver.
- If lost diver is not located the searching diver will then return to surface at the correct ascent rate, still performing a 360° search on ascent.
- Deploy safety sausage, utilize whistle (or vocally question where diver is) and wait on surface for 4 minutes.
- If lost diver is still missing, return to boat or shore and initiate emergency procedures, i.e. alert Diving Coordinator/ shore attendant, contact DSO, contact emergency services.

4.3.11 Diving before or after travel.

a) Diving after Travel

The diver shall have had adequate rest before diving.

b) Travel after Diving

- a. Altitude exposure after diving is a potent precipitator of decompression illness. After a dive, a minimum delay time should be observed prior to exposure to altitudes (e.g. air travel and road travel over mountains) – see Appendix K for a list of the minimum delay times which should be observed relative to altitudes.

5 EQUIPMENT FOR DIVING

5.1 EQUIPMENT STANDARDS AND MAINTENANCE

Each member of the diving team must know the capabilities and limitations of any equipment used. The dive leader must select appropriate equipment, based on the work site conditions and the dive plan. Equipment must not be altered, modified, or changed in any way that might impair its safe and efficient operation.

All diving equipment, including cylinders, regulators and accessories necessary for the safe conduct of the diving operation must be:

- Of approved design, sound construction, adequate strength, free from any defect and maintained in a condition that will ensure its continued operation for the purpose and depths for which it was originally designed and subsequently used
- Examined, tested, overhauled and repaired in accordance with the manufacturer's recommendations and used in accordance with AS/NZS 2299.2:2002.

5.2 SERVICE AND MAINTENANCE OF EQUIPMENT

Regulators, buoyancy vests (where they serve as an alternative air supply), gauges and metering equipment shall be serviced according to manufacturer's requirements. Any malfunction must be rectified without delay.

Records of maintenance and testing of The University of New South Wales and personal equipment used in The University of New South Wales diving operations will be kept by the

Diving Officer for at least two years.

5.3 PERSONAL DIVING EQUIPMENT

Each diver shall have the following equipment:

- (a) Open-circuit scuba, complete with cylinder and two demand regulators.
- (b) Face mask
- (c) Swimming fins
- (d) Snorkel for surface swimming
- (e) Weight belt or weight jacket with quick release closure
- (f) Submersible contents gauge for measuring remaining air pressure in cylinder
- (g) Wetsuit or protective clothing appropriate to the condition of work and the temperature of the water
- (h) Buoyancy compensator of an approved design that is inflatable orally and from a compressed air cylinder
- (i) Alternative air supply – which could comprise of; a spare second stage regulator such as an octopus regulator, a pony bottle, or a second stage regulator incorporated into the oral inflation hose of the buoyancy compensator
- (j) Watch or elapsed time indicator or dive computer
- (k) Depth gauge
- (l) Diver's knife
- (m) Safety sausage.
- (n) Shark shield

Note: Divers must apply for special consideration from the Dive Safety Committee to dive without the use of a shark shield.

5.4 SAFETY EQUIPMENT FOR DIVE TEAM

The following equipment must be available at the dive site:

- (a) Oxygen resuscitation equipment
- (b) First aid equipment
- (c) Dive flag
- (d) Communications (mobile phone, satellite phone or radio)
- (e) Copy of dive proposal and emergency procedures.

6 APPENDIX A: EMPLOYMENT OF DIVING CONTRACTORS.

In the process of engaging contractors the Diver Safety Officer will ensure the competency of the

contractor for specific tasks.

Documentation required from contractors:

- a) Each diver's certificate of medical fitness
- b) Each diver's certificate of competency for the type of dive work to be undertaken.
- c) Each dive supervisor's qualification for the type of dive work to be supervised.
- d) Each dive supervisor's experience in the type of diving work to be supervised.
- e) Evidence that the divers to be used are on the contractor's dive register.
- f) A Dive Proposal/Plan stating at a minimum:
 - i. The method of carrying out the dive work
 - ii. The tasks and duties of each person involved in the dive
 - iii. The diving equipment, breathing gases and procedures to be used in the dive
 - iv. As applicable, dive times, bottom times and decompression profiles
 - v. Hazards relating to the dive and measures to be implemented in the control of risks associated with those hazards
 - vi. Emergency procedures

When reviewing the information provided by the contractor, the University must determine if there is any additional information relating to hazards or risks to which the contractor should be informed or which may affect the contractor's ability to adequately control the risks of the dive and associated work.

Process to engaging a contractor:

When using the HS801 guideline:

1. Assess the contract type as Major according to HS801, as diving involves the risk of drowning.
2. Utilise HS804 HS (requirements checklist for tenders and contracts) to identify what information UNSW should provide to the contractor and vice versa including the documents and evidence specific to diving that is mentioned above.
3. Complete HS803 (contractor evaluation checklist) with the information obtained from the contractor in step 2.
4. If the above is satisfactory, then the contractor may be engaged.
5. If the contract involves any activity that will take place on a UNSW site, then make sure contractor personnel are inducted and records kept using form HS805 (contractor induction checklist).
6. Ensure that the contractor follows their own dive plan and other procedures relevant to the contracted tasks, such as completion of dive logs and site inductions. If there is a UNSW person on site then this can be readily verified, if not, request copies of relevant logs and records from the contractor. Non-conformances are to be noted in the online HSE reporting system.
7. Any incidents or injuries which occur involving the contractors and are notifiable to WorkCover or involves UNSW personnel must be communicated to the nominated UNSW contact (UNSW Dive Officer) within 48 hours. Any investigation by UNSW in consultation with the contractor will then be undertaken by appropriate UNSW HS staff (who may require the input of UNSW diving staff where appropriate).
8. Where a contract period extends for over 1 month of actual work, then HS809 (HS performance report for contractors) should be completed to monitor hazards and incidents related to the work.

7 APPENDIX B: Work Health and Safety Regulation 2011 Exemption No. 009/12

1. Name of Exemption

This Exemption is the Work Health and Safety Regulation 2011, Exemption No. 009/12.

2. Commencement

This Exemption commences on the date of gazettal in the NSW Government Gazette and has effect until 31 December 2017.

3. Exemption

This Exemption is made by the WorkCover Authority of New South Wales on its own initiative and applies to diving activities, which are authorised by the institutions listed below as part of honours or post graduate research or education in marine sciences.

- a. University of New South Wales
- b. University of Technology, Sydney
- c. Sydney Institute of Marine Science
- d. University of Sydney
- e. University of Newcastle
- f. University of Wollongong
- g. Macquarie University
- h. University of Western Sydney
- i. Southern Cross University
- j. Australian Catholic University

The exemption covers enrolled honours and post graduate university students (Students) and associated volunteer divers undertaking diving activities.

Specifically, Students undertaking diving for the purposes described above and associated volunteer divers are exempt from the requirements of Clause 171 that specifies competency standards for general diving work and Schedule 18B Clause 24 that specifies transitional arrangements for diving work. Such exemption is to the extent specified, and subject to the conditions, in the Schedule to this Exemption.

4. Definitions

For the purposes of this Exemption:

General diving work means general diving work as prescribed in Part 1.1 of the Regulation,

Regulation means the Work Health and Safety Regulation 2011

Volunteer diver means a person who is acting on a voluntary basis and undertakes diving activities in order to assist Students in the conduct of their research or education and who holds the same or higher diving qualifications than the Student.

Student means an enrolled honours or post graduate university student undertaking research or education in marine sciences.

SCHEDULE

This Exemption is subject to the following conditions:

(a) The Person Conducting a Business or Undertaking (PCBU) being the institutions listed in clause 3 above, must only apply this exemption to Students who undertake diving work in pursuit of formal honours or post graduate research and education coursework and volunteer divers involved in volunteer dive support of such persons.

(b) All persons described in (a) must comply with AS/NZS 2299.2:2002 Occupational Diving Operations Part 2: Scientific Diving and in particular, the qualifications and practices prescribed in Appendix A4 generally and A4.3 Restrictions (Restricted Scientific Diver) at all times.

(c) Persons described in (a) as volunteer divers must not be responsible for the management or supervision of Students on behalf of the persons conducting a business or undertaking at any time. (d) Nothing in this Exemption affects any other applicable requirement imposed by law in relation to the matters relating to this Exemption.

List of applicable Regulations:

(a) NSW Work Health & Safety Regulation 2011.

8 APPENDIX C: HAZARD IDENTIFICATION AND RISK ASSESSMENT

Hazard identification and risk assessment should be performed at the dive proposal stage and as part of the pre-dive plan. Hazards that arise during a dive should be immediately brought to the attention of the Dive Coordinator so that the dive plan can be altered to ensure the health and safety of the divers or the dive aborted.

The following steps are used to manage occupational health and safety risks arising in scientific diving operations.

- Step 1. Identify hazards and hazardous tasks
- Step 2. Assess the nature of the risk created by those hazards and hazardous tasks
- Step 3. Assess the degree of exposure to the risks and the potential of the risks to cause injury or illness
- Step 4. Eliminate or control the risks
- Step 5. Review the adequacy and effectiveness of the adopted control measures.

Risk assessment of diving operations should identify and take into account the following:

- Environmental conditions, e.g.
 - strength and direction of wind and its potential influence on diving operations and emergency response capability
 - atmospheric temperature and humidity currents and tides
 - time of day
 - water temperature
 - visibility
 - underwater terrain
 - entrapment hazards
 - contaminants,
 - isolation of the site, etc
- Task factors, e.g. complexity, non-routine tasks may increase level of risk
- Hyperbaric/Physiological factors, e.g.
 - depth and duration of dive
 - frequency of diving, multiple ascents, repetitive diving, multi-day diving
 - breathing gas
 - exertion required to reach site and conduct tasks
 - immediate pre-dive fitness
 - altitude exposure
 - excessive noise, etc
- Factors relating to associated activities, e.g. manual handling, boat handling and dive platforms, etc
- Emergency response factors, e.g. location and availability of emergency facilities and systems, etc
- Other hazards that could be encountered during the diving operations, e.g. dangerous marine animals, water inlets, shipping, use of hazardous substances, biological pollutants or explosives, etc.

Hazard identification and risk assessments should be documented using the forms in appendices B and C, together with any additional documentation relevant to the particular situation.

Risks in diving operations should be controlled in accordance with the hierarchy of controls i.e.

1. Elimination – if the risk cannot be adequately controlled, no diving should take place
2. Substitution – if an alternative method is available that entails less risk, it should be considered
3. Design – procedures and equipment should be designed to minimize risk
4. Isolation – divers and others should be separated from identified hazards if feasible
5. Administrative – covers many aspects of dive safety including adequate training, supervision and experience of the dive team members, adequate organization and planning of the dive and selection of appropriate means of communication to minimize risk; the dive plan should minimize the duration and degree of each diver's exposure to risk
6. Personal Protective Equipment – appropriately designed and sized equipment provided, used and maintained and the limitations of the equipment understood in order to minimize risks to the dive team.

Further guidance on hazard identification, risk assessment and control can be found in Appendix G of AS/NZS 2299.2:2002

9 APPENDIX D: DIVER REGISTER

Name:	
Address:	
Date of Birth:	
Contact number:	
Status:	Staff, Visitor, Honors Student, Post Grad Student, Volunteer

Next of Kin

Name:	
Address:	
Phone Number:	
Relationship:	

Diving

	Details	Sighted by DSO
Highest Diving Qualification: (attach copy)		
Senior First Aid: (attach copy)		
Advanced Resuscitation: (attach copy)		
Additional Qualifications: (attach copy)		
Most Recent Diving Medical: (attach copy)		
Number of Logged Dives:		
Number of Logged Hours:		

Any Diving Related Accidents or Incidents

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I have read the UNSW Australia Scuba Diving Operations Manual, the WHS Regulation 2011 and the AS2299.2	(Signature and Date)
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Approved as:	Dive Coordinator, Scientific Diver, Restricted Scientific Diver, Visiting Scientific Diver, Visiting Restricted Scientific Diver
DSO's signature and Date:	

10 APPENDIX E -DIVE PROPOSAL FOR SCUBA (page 1 of 3)

Dive coordinator:		Medical expiry:	
First Aid Expiry:		O2 Expiry:	
Contact Phone Number:			

Other Dive Team Members (including non-divers):

Name:		Medical expiry:	
First Aid Expiry:		O2 Expiry:	
Name:		Medical expiry:	
First Aid Expiry:		O2 Expiry:	

Person to be notified on leaving and returning to the University/ Field Camp:

Name:		Phone number:	
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Location(s) (**latitude and longitude or Grid Reference**) of Dive(s)

Location 1:	
Location 2:	

Type of Dive(s):

i.e. Boat type and name, shore, drift etc	
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Dive Profile:

	Date	Location	Start time	Max depth	Dive time	EBT (ABT x RF)	RG	SI mins	RF
Dive 1									
Dive 2									
Dive 3									

Has a Risk Management Form for your proposed work been approved by the UNSW HS officer? YES / NO

Has a Site Assessment of the proposed site been completed? YES / NO

If not, I affirm that a Risk Assessment will be conducted on site. (Signature)	
--	--

Sheltered Open Water Site:

Is this site a 'Sheltered Open Water Site' as specified in 4.3.2 in the Scuba Diving Operations Manual? YES / NO

Equipment:

Has all of the SCUBA equipment to be used been serviced in the past 12 months or as required by AS/NZ 2299.2? YES / NO

GENERAL RISK ASSESSMENT FOR DIVE PROPOSAL (page 2 of 3)

1. What type of work is proposed? Please note the tasks/duties of EACH member of the dive team. Please note any diving equipment or gas used other than SCUBA and AIR.

--

2. *Hazards*

Sharp Edges	Yes / No	Soft Sediment Benthos	Yes / No
Entanglement	Yes / No	Difficult Access	Yes / No
Exceeding Maximum Depth	Yes / No	Pollution	Yes / No
Dispersion	Yes / No	Cold	Yes / No
Decompression	Yes / No	Thermal Hazards	Yes / No
Tide / Currents	Yes / No	Remote Sites	Yes / No
Boat Traffic	Yes / No	Noise	Yes / No
Shipping	Yes / No	Altitude (eg Mount White and Mount Ousley)	Yes / No
Poor Visibility	Yes / No	Isolation	Yes / No
Dangerous Marine Animals	Yes / No	Distance	Yes / No
Walls	Yes / No	Gases	Yes / No
Overhead Environment	Yes / No	Other	

3. *If any of the above applies, indicate your mitigating measures:*

--

Surface attendant not required as diving in sheltered water under exceptional circumstances. Approved subject to conditions as specified in 4.3.2 in the UNSW Scuba Diving Operations Manual? YES / NO

EMERGENCY PLAN FOR DIVE PROPOSAL (page 3 of 3)

Emergency Phone Number:	000
Mobile Emergency Number:	112
Divers Emergency Service (DES) in Australia	1800 088 200
Divers Emergency Service (DES) International	+61 8 8212 9242

Dive Site:	
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(If there are multiple sites, then an Emergency plan MUST be completed for each location)

What are the directions to the dive site for emergency Services?

--

Where is/are the nearest hospitals to your proposed dive site and telephone number?

--

Where is the nearest recompression chamber and telephone number?

--

Where is your home base while carrying out the proposed dives and what is the phone number?

--

Do you have OXYGEN at the dive site?	YES / NO
Do you have FIRST AID at the dive site?	YES / NO

Communications with dive team:

Mobile 1	
Mobile 2	
Satellite Phone	
Boat Radio	VHF / HF / 28Mhz/ NA
Does the boat have an EPIRB?	YES / NO / NA

Emergencies involving fatalities, serious injuries or serious decompression illness must be reported as soon as possible to the University contacts.

I acknowledge that I will brief the entire dive team on all aspects of this Dive Proposal prior to diving and I will keep a copy on the dive site.

Coordinator Signature:		Date:	
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Approved by DSO:		Date:	
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11 APPENDIX: F – ONSITE PREDIVE PLAN AND RISK ASSESSMENT

To be completed before each dive and returned to the Diving Officer:

Dive coordinator:	
Date:	

Site Registration:

Location:	
Maximum depth for each team:	
Bottom time for each team:	

Circle all applicable hazards and measures taken, tick when done and then sign:

Identified Hazards	Possible Hazards	Measures Taken	Comments and Sign
Weather	Nil, Wind Speed, Direction	Forecast, Monitor, Cancel	
Sea state	Smooth, Slight, Moderate, Rough	Monitor, Revise plan, Cancel	
Underwater	Nil, Low Visibility, Entrapment, Tide	Check Visibility, Revise Plan, Cancel	
Pollution	Assumed negligible, High Level	Monitor, Revise Plan, Cancel	
Depth	Nil, Possibility of exceeding depth	Max Depth/Direction given	
Temperature	Nil, Excessive Cold/ Heat	Suitable diving protection	
Access	Shore, Boat, Platform	Ladder provided, Other	
Shipping	Nil, Port Traffic, N/A	VHF monitored, Lookout, Flag Alpha, Liaison with Skipper	
Diving Safety	Ears, Lungs, Separation, Air checks	Briefed, SMB, times and depths etc	
Dangerous Marine Animals	Assumed negligible, Present, Abundant	Brief, Monitor, Revise plan, Abort	
Thermal Exposure	Shade, Rehydration, Sunscreen, Protective clothing	Monitor, Revise Plan, Abort	
Other / Comments			

Checklist:

Category	Prompts	Done?
Divers	Feeling fit for the dive? Adequately experienced for dive? Briefed on dive plan and tasks?	
RCC	Available and location determined.	
Dive Plan	Dive Plan signed? Permit to dive granted?	
Safety Equipment	Oxygen checked and working? First aid kit? Diver recall system? Mobile phone signal/charged? VHF working? Knife? Safety sausage?	
Dive Site	Pre-dive equipment checks? Authorities notified?	

SURFACE SUPPORT

Is there a diver's attendant (surface watch)?	YES / NO
---	----------

If NO: (If YES, skip to physiological factors)

Is the depth less than 12m?	YES / NO
Is visibility greater than 4m? – check if necessary	YES / NO
Is wave height less than 1m?	YES / NO
Is current nil to slight?	YES / NO
Is it daylight hours?	YES / NO
Do you have a Flag Alpha to carry whilst diving?	YES / NO

If the answer was NO to any of the above questions – ABORT DIVE.

PHYSIOLOGICAL FACTORS:

Do the dives include?

Multiple ascents	YES / NO
Repetitive dives	YES / NO
Multi-day dives	YES / NO
Excessive exertion	YES / NO
Other (please specify)	

If YES, describe hazard and precautions taken:

--

Residual Nitrogen for each Diver:

Dive Team Members:	Repetitive Group:

Dive coordinator:

Name (please print)			
Signature:		Date:	

Dive Team:

I acknowledge that I have been briefed on the dive plan, my tasks, the associated risks, safety considerations and emergency procedures.

Name:		Signature:	
Name:		Signature:	
Name:		Signature:	
Name:		Signature:	

12 APPENDIX G: UNSW AUSTRALIA DIVE LOG.

NOTE: Please write ALL persons in the dive team on this form (eg boat driver, surface attendant, snorkelers)

O2 check	Date	Location	Dive #	Name and task	Depth	Bar In	Bar Out	Time In	Time Out	Bottom Time	RG	SI	RF	EBT (BTxRF)	Diver Well? (Signature)

Any incidents, difficulty, discomfort or injury occurred on the dive:

I verify that all dive team members are accounted for.

Dive Coordinator's signature and date: _____

Dive Officer's signature and date: _____

13 APPENDIX H: DECOMPRESSION PROCEDURES

Reduced Bottom Time Limits for Remote Locations

TABLE 4.1
TIME LIMITS FOR DIVES, DEPENDING ON LEVEL
OF RECOMPRESSION CHAMBER SUPPORT

Maximum dive depth m	Maximum bottom time, min	
	Column A (chamber within 2 h)	Column B (chamber exceeds 2 h)
6	480	360
9	240	190
12	150	120
15	75	60
18	50	40
21	35	30
24	25	20
27	20	15
30	15	10

NOTE: For depths between 12 m and 30 m, the bottom time limits are based upon the DCIEM tables. Column A lists the 'no-deco' limits. Column B represents one repetitive group less than the 'no-deco' limits.

TABLE 4.2
LIMITS FOR REPETITIVE DIVES, DEPENDING
ON LEVEL OF RECOMPRESSION CHAMBER SUPPORT
(BASED ON DCIEM TABLES)

Maximum dive depth m	Maximum repetitive group	
	Column A (chamber within 2 h)	Column B (chamber exceeds 2 h)
6	H	G
9	H	G
12	H	G
15 to 30	DCIEM no deco limits	One repetitive group inside the DCIEM no deco limits

Amendments to DCIEM procedures

- (a) The rate of ascent should be 18 metres \pm 3 metres per minute
- (b) A 3 minute stop is recommended for all dives deeper than 12 metres
- (c) Repetitive dives should always be shallower than the previous dives
- (d) A maximum depth of 27 metres is recommended for second dives and 15 metres for the third dive
- (e) The group letter for each repetitive dive must be higher than the RG from the preceding dive. Otherwise add one letter to the preceding dive RG and use the higher RG letter. e.g. 1st dive RG = C, 2nd dive RG = D, 3rd dive RG = E
- (f) If more than two dives a day are conducted on three consecutive days, diving should not be carried out on the fourth day.

14 APPENDIX I: DIVING PROCEDURES AND EMERGENCY ACTION PLAN FOR INCIDENTS INVOLVING LOSS OF LIFE (POTENTIAL OR ACTUAL) OR SEVERE INJURY.

University of New South Wales

GENERAL PROCEDURES:

- **“RESCUER” must not put themselves in danger**
- **Maintain airway, Administer 100% oxygen**
- **Administer First Aid**
- **Remove casualty from danger if safe to do so**
- **Seek Medical / Rescue Assistance**

The exact order of these will vary with the incident, and the resources available.

1. DURING DIVING OPERATIONS:

Shore Diving:

- (a) If a participant shows signs or symptoms of decompression illness or has had ANY ABNORMAL ASCENT (missed decompression stops or fast ascents): Place casualty on 100% oxygen immediately and seek medical advice immediately.
- (b) If casualty is unconscious call for an ambulance (000) first, then contact Hyperbaric Units (Divers Emergency Service (1800 088 200)).
- (c) If casualty is conscious contact Divers Emergency Service (1800 088 200) and follow instructions. Rescue Divers and those with more advanced rescue and/or first aid qualifications to manage the incident. Diving incident slate to be written immediately. Only when situation is stable and/or emergency services have taken over should University Risk Management Office (02 9385 1565 - during office hours) be notified and the University Security Service (02 9385 6666 – after hours). Effective management of the situation will involve delegation.

Boat Diving:

- (d) If a diver shows signs or symptoms of decompression illness or has had ANY ABNORMAL ASCENT (i.e. rapid ascent), place casualty on 100% oxygen immediately and request advice/assistance.
- (e) Contacts: Marine Rescue on VHF Ch16 and follow instructions, if radio is not answered try mobile phone, follow action as in 1(a-c), if phone is not answered then proceed to nearest safe haven and repeatedly try to contact Coastguard (marine radio or phone). Rescue

Divers and those with more advanced rescue and/or first aid qualifications to manage the incident. A Diving Incident slate should be written immediately. Only when situation is stable and/or emergency services have taken over should University Risk Management Office (02 9385 1565 - during office hours) be notified and the University Security Service (02 9385 6666 - after hours). Effective management of the situation will involve delegation. If signs or symptoms appear on land (up to 24hours post-diving), follow action as if shore diving.

REQUIRED SAFETY EQUIPMENT:

- First Aid Kits
- Medical grade oxygen cylinder and giving sets (ensure that enough oxygen is available to transport diver to Emergency Services (boat dive), or utilise until Emergency Services arrive (shore dive).
- VHF radio charged and working (boat dive)
- Flares (boat dive)
- Knowledge of nearest emergency phone or possession of a mobile phone.

EVACUATION:

In the event of any registered diver being evacuated to a hospital or hyperbaric chamber, he or she should where possible, be accompanied by the diving coordinator, or other diver not in need of treatment, the destination noted and passed to the University contact person and DSO. If this is not possible, then the diving coordinator or an uninjured diver MUST ensure that they have a record of where the casualty goes.

POST INCIDENT:

Thank Emergency services.

Diving Officer to be notified.

Incident (University and DAN) reports to be completed.

DAN incident form sent to DAN headquarters.

Diving Officer to review incident

15 APPENDIX J: DAN DIVING INJURY REPORT FORM

DIVING INCIDENT REPORT

DAN is a non-profit dive safety organisation whose aim is to sponsor data collection and research into diving incidents, and their prevention. To support this research, DAN collects and analyses information about diving incidents. DAN SEAP undertakes to hold the names and contacts of individuals involved as confidential.

INFORMATION ABOUT THE INCIDENT

Date:

Time:

Nearest Town:

BRIEF DESCRIPTION OF INCIDENT

TYPE OF INCIDENT

Decompression Illness

Drowning / near drowning

Trauma

Other:

DETAILS OF INJURED PERSON

Name:

Contacts:

Age / Birthdate:

Gender:

Certification Level

Not known

Instructor

In Training Open Water

Technical

Advanced

Commercial

Dive master

Experience:

Years diving:

Total no. of dives:

Total dives in last 12 months:

Outcome:

Fatal

Non-Fatal

REPORTED BY:

Name:

Email:

Contact Ph:

16 APPENDIX K: MINIMUM DELAY BEFORE EXPOSURE TO ALTITUDE

Recommended Delay Before Exposure to Altitude

Altitude (meters)	Minimum delay before travel to altitude (hours)		
	Category of dive (see legend)		
	Category 1	Category 2	Category 3
0 - 150	Nil	Nil	2
150 – 600	Nil	2	12
600 – 2 400	12	24	48
Greater than 2 400	24	48	72

LEGEND:

Category 1 = A single dive to $\leq 50\%$ of the DCIEM no-decompression limit or two short dives within 18 h with a total, combined bottom time of $\leq 50\%$ of the no-decompression limit for the depth of the deeper dive. No decompression diving or repetitive dives in previous few days.

Category 2 = Dives exceeding Category 1 but not included in Category 3, e.g. one or more dives to $\geq 50\%$ of the no-decompression limits or a single decompression dive a day.

Category 3 = Repetitive deep diving over multiple days, multiple decompression dives on one day, extreme exposures; omitted decompression; or other adverse events.

NOTES:

1. The altitude referred to is the effective attitude. In pressurized aircraft the relevant environment is the effective altitude of the aircraft cabin and not the flying altitude. Commercial aircraft are usually pressurized to achieve an effective cabin altitude of 2400m or less.
2. The recommendations given in the above table are drawn from expert opinion regarding what would be safe for routine diving operations. The risk of decompression illness varies substantially with differing dive profiles, and data regarding risks associated with altitude exposure after diving is limited. Specialist advice is recommended whenever altitude exposure following diving is planned.

SYDNEY METROPOLITAN AREA:

The RTA (NSW) informed The University of New South Wales Diving Officer (15.04.2005) that:

- Mount Ousley (Wollongong) is a maximum of 400 meters above sea level
- And Mount White (F3, near Gosford) is approximately 300 meters above sea level.

17 APPENDIX L: REGISTERED OCCUPATIONAL DIVING MEDICS IN METROPOLITAN SYDNEY

SOUTH PACIFIC UNDERWATER MEDICINE SOCIETY.
Registered Occupational Diving Medics.

NAME:	ADDRESS:	PHONE:
Dr Priti Bhatt	Suite 506 Level 5, 74 Pitt Street Sydney	1300 892 490
Dr Susan Willis	University Health Service University of Sydney SYDNEY	02 9351 3484

18 APPENDIX M: NITROX DIVING (INFORMATIVE)

Nitrox is a combination of oxygen and nitrogen where the percentage of oxygen is increased from standard air, which is approximately 21% oxygen and 79% nitrogen. In Nitrox diving the mix of oxygen is from 22% to 40% in water depths less than 130fsw/40msw.

Nitrox divers have less nitrogen in their tanks than air divers. For an equivalent dive they absorb less nitrogen into their bodies and are less exposed to Decompression Sickness (DCS). Using Standard Air Dive Tables on Nitrox gives increased physiological safety, especially for people who are more at risk from DCS. The increased risk factors include: obesity, illness, older age, fatigue, heavy exertion during and or after a dive, are reduced by the use of Nitrox. Divers can benefit through increased bottom time and shorter surface intervals if they are not affected by such risk factors.

Diving cylinders used for Nitrox are defined with a Green band and labeling these are only used for Nitrox, this is to avoid a person using a tank thinking it is air when it is Nitrox or using a Nitrox tank thinking it is for air. This sort of mistake can result in a diver extending the no decompression limits thinking he is using Nitrox or, alternately, thinking he has air, the diver exposes himself to central nervous system (CNS) oxygen toxicity with Nitrox. Regulators using less than 39% oxygen can be used for air or Nitrox diving. Divers must check their own Nitrox fills with an oxygen analyzer and sign off on the fill log at the fill facility. Cylinders are tagged describing fill pressure, oxygen, analysis date, maximum oxygen depth, name of user and cylinder number.

A standard Nitrox course will equip a diver with the understanding and training to use this gas mix to increase safety margins, while working to air dive tables. It can increase dive times and shorten dive time intervals.

Information sourced from Technical Diving International