The University of New South Wales

SCUBA DIVING OPERATIONS MANUAL

This is a working document and subject to change

University of New South Wales Diving Safety Committee
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NSW Scientific Divers Committee
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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 as an employer under NSW Occupational Health and Safety Act 2000. All scientific diving operations will be conducted according to AS/NZS 2299.2:2002 and WHS Regulation 2011.

The purpose of this Scuba Diving Operations Manual is to assist in the interpretation of AS/NZS 2299.2:2002 and WHS Regulation 2011, and to define roles and responsibilities in diving operations at The University of New South Wales. Through this Scuba Diving Operations Manual, The University of New South Wales seeks to manage its obligations by identifying hazards, removing any associated risks and/or installing control measures 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 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.

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 2299.2:2002 Scientific diving
- AS 2815.1-1992 Training and certification of occupational divers Part 1: SCUBA diving to 30m
- WHS Regulation 2011

This document should be read in conjunction with the University’s Fieldwork Safety Guidelines [http://www.ohs.unsw.edu.au/ohs_policies/guidelines/OHS406_UNSW_Fieldwork_Guidelines]
2010.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 then 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 role 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 & RESPONSIBILITES

3.1 EMPLOYER

The employer shall:

- Install 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 the under NSW Occupational Health and Safety Act 2000, AS 2299.2:2002 Scientific diving, WHS Regulation 2011 and this Diving Operations Manual
and allocate necessary resources where applicable,
• Appoint and consider recommendations made by the Scientific Diving Advisory Committee, and
• Periodically review the management process regarding diving practices under their responsibility
• Appoint Diving Officer(s) with the responsibilities as set out under 3.3.

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 2299.2:2002 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 2299.2:2002 and WHS Regulation 2011, 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/NZ2299.2:2002
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/NZS4005.2:2000 *(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 2299.2:2002, 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


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 AS/NZS4005.2:2000 (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.

3.7 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 2299.1:1999 (see Appendix J 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 2299.2:2002, WHS Regulations 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 D. 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 A
All staff, students, contractors, 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.

4.2.2 Dive Proposal – see Appendix B
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 C
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 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 10 metres,  
2. Visibility greater than 4 metres,  
3. Wave height less than 0.5 metre,  
4. Current nil to slight,  
5. Daylight hours, and  
6. 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 for tracking particles

These procedures are not appropriate for open ocean blue water diving, but are to be applied to blue water diving in waters 20-30 m deep over the continental shelf. For open ocean blue water diving, the use of a mother ship for coordination must be considered and appropriate procedures developed in conjunction with the Diving Officer.

Diving will be conducted from a small, outboard-powered boat, with a dive team comprising two divers and one boat operator. The operator will circle the divers’ bubbles at idle speed at a radius of 20-30 m. A dive flag is displayed throughout. If the boat operator loses sight of the divers’ bubbles, he/she motors at idle speed into the wind constantly scanning the area until the divers surface. The boat operator keeps track of vessels in the vicinity, and wards off any vessels approaching too close to the divers.

If conditions are such that the boat operator cannot easily keep track of the divers’ bubbles at the surface, one of the divers must be equipped with a light line attached to a small surface float to enable the boat operator to stay in the vicinity of the divers. In addition to normally-required dive gear, divers must be equipped with a dive computer and a compass.

4.3.6 Use of decompression tables

All dives including repetitive dives must be calculated using DCIEM tables (Canadian Defence and Civil Institute for Environmental Medicine). A copy of the DCIEM tables can be viewed at: http://www.bees.unsw.edu.au/webfm_send/263. Divers should note that UDT, the licensee and manufacturer of DCIEM tables have recommended amendments covering the use of these tables (see Appendix E).

Maximum bottom times must be reduced according to Table 3.1 AS/NZS 2299.2:2002 if diving is conducted without a recompression chamber on site (see Appendix E). 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 2299.2:2002, 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 2299.2:2002, WHS Regulation 2011 this manual and the procedures of the institution conducting the diving operation.

4.3.9 Incident Reporting

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

The Dive Coordinator 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.

When 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.

The University's Occupational Injury, Illness and Incident Report Form and a DAN incident report form will be used for reporting incidents as per the University's Policy on Accident Reporting – see Appendix H and Appendix I. The University of New South Wales Report Form can be located through: http://www.my.unsw.edu.au – H20 – Zero to Harm.

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
- Once on surface, 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 L 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.

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 - DIVER REGISTER

## PERSONAL DIVING RECORDS

<table>
<thead>
<tr>
<th>Name:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td></td>
</tr>
<tr>
<td>Date of Birth:</td>
<td></td>
</tr>
<tr>
<td>Signature and Date:</td>
<td></td>
</tr>
<tr>
<td>Status:</td>
<td>Permanent Staff, Temporary Staff, Visitor, Honors Student, Post Grad Student, Volunteer</td>
</tr>
</tbody>
</table>

### Next of Kin

<table>
<thead>
<tr>
<th>Name:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td></td>
</tr>
<tr>
<td>Phone Number:</td>
<td></td>
</tr>
<tr>
<td>Relationship:</td>
<td></td>
</tr>
</tbody>
</table>

### Diving

<table>
<thead>
<tr>
<th>Highest Diving Qualification:</th>
<th>Details</th>
<th>Sighted by DSO</th>
</tr>
</thead>
<tbody>
<tr>
<td>(attach copy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior First Aid:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(attach copy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Resuscitation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(attach copy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Qualifications:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(attach copy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most Recent Diving Medical:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(attach copy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Logged Dives:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Logged Hours:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Any Diving Related Accidents or Incidents

<table>
<thead>
<tr>
<th>Comments</th>
<th></th>
</tr>
</thead>
</table>

I have read the University of New South Wales Scuba Diving Operations Manual and the AS2299.2:2002 (Signature and Date)

<table>
<thead>
<tr>
<th>Approved as:</th>
<th>Dive Coordinator, Scientific Diver, Restricted Scientific Diver, Visiting Scientific Diver, Visiting Restricted Scientific Diver</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSO's signature and Date:</td>
<td></td>
</tr>
</tbody>
</table>
7. APPENDIX B - DIVE PROPOSAL FOR SCUBA (page 1 of 3)

<table>
<thead>
<tr>
<th>Dive coordinator:</th>
<th>Date of last medical:</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Aid Expiry:</td>
<td>O2 Expiry:</td>
</tr>
<tr>
<td>Contact Phone Number:</td>
<td></td>
</tr>
</tbody>
</table>

List of Dive Team Members:

<table>
<thead>
<tr>
<th>Name:</th>
<th>Date of last medical:</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Aid Expiry:</td>
<td>O2 Expiry:</td>
</tr>
<tr>
<td>Name:</td>
<td>Date of last medical:</td>
</tr>
<tr>
<td>First Aid Expiry:</td>
<td>O2 Expiry:</td>
</tr>
<tr>
<td>Name:</td>
<td>Date of last medical:</td>
</tr>
<tr>
<td>First Aid Expiry:</td>
<td>O2 Expiry:</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone number:</td>
</tr>
</tbody>
</table>

Location(s) *(latitude and longitude or Grid Reference)* of Dive(s)

<table>
<thead>
<tr>
<th>Location 1:</th>
<th>Location 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date(s):</td>
<td>From:</td>
</tr>
<tr>
<td></td>
<td>To:</td>
</tr>
</tbody>
</table>

Type of Dive(s):

<table>
<thead>
<tr>
<th>Boat type and name, shore, drift etc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diving equipment (SCUBA, nitrox) etc</td>
</tr>
</tbody>
</table>

Dive Profile:

<table>
<thead>
<tr>
<th>Dive 1</th>
<th>S1 (min)</th>
<th>Dive 2</th>
<th>S1 (min)</th>
<th>Dive 3</th>
<th>S1 (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start time</td>
<td></td>
<td>Max depth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total dive time</td>
<td></td>
<td>Repetitive</td>
<td></td>
<td></td>
<td>Group</td>
</tr>
</tbody>
</table>

Risk Assessment:

Has a Risk Assessment for your proposed work been approved by UNSW? YES / NO
Has a Site Assessment of the proposed site been completed? YES / NO
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 2299.2:2002? YES / NO

<table>
<thead>
<tr>
<th>Signature (Coordinator):</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature (Diving Safety Officer):</td>
<td>Date:</td>
</tr>
</tbody>
</table>
1. *What type of work is proposed? (including method of carrying out the diving work and the tasks and duties of each person involved in the dive).*

2. *Hazards*

<table>
<thead>
<tr>
<th>General Hazards</th>
<th>Yes / No</th>
<th>General Hazards</th>
<th>Yes / No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharp Edges</td>
<td></td>
<td>Soft Sediment Benthos</td>
<td></td>
</tr>
<tr>
<td>Entanglement</td>
<td></td>
<td>Gases</td>
<td></td>
</tr>
<tr>
<td>Exceeding Maximum Depth</td>
<td></td>
<td>Remote Sites</td>
<td></td>
</tr>
<tr>
<td>Overhead Environment</td>
<td></td>
<td>Dangerous Marine Animals</td>
<td></td>
</tr>
<tr>
<td>Shipping</td>
<td></td>
<td>Difficult Access</td>
<td></td>
</tr>
<tr>
<td>Tide / Currents</td>
<td></td>
<td>Cold</td>
<td></td>
</tr>
<tr>
<td>Decompression</td>
<td></td>
<td>Pollution</td>
<td></td>
</tr>
<tr>
<td>Boat Traffic</td>
<td></td>
<td>Thermal Hazards</td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td></td>
<td>Isolation</td>
<td></td>
</tr>
<tr>
<td>Dispersion</td>
<td></td>
<td>Altitude</td>
<td></td>
</tr>
<tr>
<td>Walls</td>
<td></td>
<td>Noise</td>
<td></td>
</tr>
<tr>
<td>Poor Visibility</td>
<td></td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

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

Dive Proposal Approved by DSO: [Signature] Date: 

Two person dive team, approved subject to conditions as specified in 4.3.2 in the UNSW Scuba Diving Operations Manual? YES / NO

Record Submitted (DSO Signature): [Signature] Date: 
## Emergency Plan for Dive Proposal (page 3 of 3)

2 COPIES:
- Copy for Dive Team
- Copy to be retained by Diving Officer

<table>
<thead>
<tr>
<th>Emergency Phone Number:</th>
<th>000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Emergency Number:</td>
<td>112</td>
</tr>
</tbody>
</table>

### Divers Emergency Service (DES):

<table>
<thead>
<tr>
<th>Country</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Australia</td>
<td>1800 088 200</td>
</tr>
<tr>
<td>International</td>
<td>61 8 8212 9242</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dive Site:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(If there are multiple sites, then an Emergency plan MUST be completed for each location)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the directions to the dive site for Emergency Services?</td>
<td></td>
</tr>
<tr>
<td>Where is/are the nearest hospitals to your proposed dive site and Telephone Number?</td>
<td></td>
</tr>
<tr>
<td>Where is the nearest Recompression Chamber and Telephone number?</td>
<td></td>
</tr>
<tr>
<td>Where is your home base while carrying out the proposed dives?</td>
<td></td>
</tr>
<tr>
<td>Phone number at home base?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have OXYGEN at the dive site?</td>
<td>YES / NO</td>
</tr>
<tr>
<td>Do you have FIRST AID at the dive site?</td>
<td>YES / NO</td>
</tr>
</tbody>
</table>

### Communications with dive team:

<table>
<thead>
<tr>
<th>Communication Method</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile 1</td>
<td></td>
</tr>
<tr>
<td>Mobile 2</td>
<td></td>
</tr>
<tr>
<td>Satellite Phone</td>
<td></td>
</tr>
<tr>
<td>Boat Radio</td>
<td>VHF / HF / 28Mhz</td>
</tr>
<tr>
<td>Does the boat have an EPIRB?</td>
<td>YES / NO</td>
</tr>
</tbody>
</table>

Emergencies involving fatalities, serious injuries or serious decompression illness must be reported as soon as possible to the University contacts. The Risk Management Office must also be promptly informed of any such emergencies in order to comply with legal requirements. The Risk Management Office telephone number is 02 9385 1565
8. APPENDIX C – 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:

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

Other / Comments

Checklist:

<table>
<thead>
<tr>
<th>Category</th>
<th>Prompts</th>
<th>Done?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Divers</td>
<td>Feeling fit for the dive? Adequately experienced for dive?</td>
<td></td>
</tr>
<tr>
<td>RCC</td>
<td>Available and location determined.</td>
<td></td>
</tr>
<tr>
<td>Dive Plan</td>
<td>Dive Plan signed? Permit to dive granted?</td>
<td></td>
</tr>
<tr>
<td>Dive Site</td>
<td>Pre-dive equipment checks? Authorities notified?</td>
<td></td>
</tr>
</tbody>
</table>
**SHELTERED OPEN WATER**

<table>
<thead>
<tr>
<th>Question</th>
<th>YES / NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is this a Dive Team of 2 people?</td>
<td>YES / NO</td>
</tr>
<tr>
<td>If YES: (If NO, continue to next section)</td>
<td></td>
</tr>
<tr>
<td>Is the depth less than 10m?</td>
<td>YES / NO</td>
</tr>
<tr>
<td>Is visibility greater than 4m? – check if necessary</td>
<td>YES / NO</td>
</tr>
<tr>
<td>Is wave height less than 0.5m?</td>
<td>YES / NO</td>
</tr>
<tr>
<td>Is current nil to slight?</td>
<td>YES / NO</td>
</tr>
<tr>
<td>Is it daylight hours?</td>
<td>YES / NO</td>
</tr>
<tr>
<td>Do you have a Flag Alpha to carry whilst diving?</td>
<td>YES / NO</td>
</tr>
</tbody>
</table>

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

**HYPERBARIC / PHYSIOLOGICAL FACTORS:**

*Do the dives include?*

<table>
<thead>
<tr>
<th>Factor</th>
<th>YES / NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple ascents</td>
<td>YES / NO</td>
</tr>
<tr>
<td>Repetitive dives</td>
<td>YES / NO</td>
</tr>
<tr>
<td>Multi-day dives</td>
<td>YES / NO</td>
</tr>
<tr>
<td>Excessive exertion</td>
<td>YES / NO</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

If YES, describe hazard and precautions taken:

---

**Residual Nitrogen for each Diver:**

<table>
<thead>
<tr>
<th>Dive Team Members:</th>
<th>Repetitive Group:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dive coordinator:**

<table>
<thead>
<tr>
<th>Name (please print)</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dive Team:**

*Dive Brief? Has the Dive Coordinator given instructions in relation to the dive plan before commencing the diving work to which the plan relates?*

<table>
<thead>
<tr>
<th>Name:</th>
<th>Signature:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
University of New South Wales
Dive Planner.
To be completed FOR each dive and returned to the Diving Officer with the Onsite Pre-dive Plan and Risk Assessment.

Dive Coordinator:

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Dive #</th>
<th>Divers</th>
<th>Depth</th>
<th>O2 Bar</th>
<th>Bar In</th>
<th>Bar Out</th>
<th>Time In</th>
<th>Time Out</th>
<th>Bottom Time</th>
<th>RG</th>
<th>SI</th>
<th>RF</th>
<th>EBT (BTxRF)</th>
<th>Diver Well?</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

Any incident, difficult, discomfort or injury that occurs or is experienced during the dive?

Dive Coordinator’s Signature: ____________________________        Dive Officer’s Signature: ___________________________

Date: ________________________________________________   Date: ___________________________________________
9. APPENDIX D – 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
10. APPENDIX E - DECOMPRESSION PROCEDURES

Reduced Bottom Time Limits For Remote Locations

<table>
<thead>
<tr>
<th>Maximum depth of dive (m)</th>
<th>Maximum bottom time (mins)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COLUMN A Chamber within 2 hours</td>
</tr>
<tr>
<td>3</td>
<td>No limit</td>
</tr>
<tr>
<td>6</td>
<td>240 (400)</td>
</tr>
<tr>
<td>9</td>
<td>180</td>
</tr>
<tr>
<td>12</td>
<td>120</td>
</tr>
<tr>
<td>15</td>
<td>75</td>
</tr>
<tr>
<td>18</td>
<td>50</td>
</tr>
<tr>
<td>21</td>
<td>35</td>
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<tr>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>27</td>
<td>20</td>
</tr>
<tr>
<td>30</td>
<td>15</td>
</tr>
</tbody>
</table>

Amendments to DCIEM procedures

(a) The rate of ascent should be 10 metres ± 3 metres per minute
(b) A 3 minute stop is recommended for all dives below 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.
(g) When diving in remote locations add 2 consecutive letters when calculating the RG group for conservative measures e.g. 1st dive RG = B, then calculate the EBT using RG = D.
11. APPENDIX F - 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
These procedures are not appropriate for true blue water diving (open ocean), but are to be applied to blue water diving in waters 20-40 m deep over the continental shelf. For open ocean blue water diving, the use of a mother ship for coordination must be considered and appropriate procedures developed in conjunction with the Diving Officer. Procedures developed for blue-water diving by zooplankton biologists involving a shot line, tethers between divers and the line, and a ‘look-out’ diver are inappropriate for a research protocol that requires the divers be free to follow a released larva.

**Equipment**
In addition to normally-required dive gear, divers must be equipped with a dive computer and an orange ‘safety sausage’. If conditions are such that the boat operator cannot easily keep track of the diver’s bubbles at the surface, one of the divers must be equipped with a light line attached to a small surface float to enable the boat operator to stay in the vicinity of the divers. A ‘shot line’ is not used because the divers are following a released fish. Divers have a compass, and a hand-held flow meter.

**Boat operation**
Diving is conducted from a small, outboard-powered boat, with a dive team comprising two divers and one boat operator. The operator circles the divers’ bubbles at idle speed at a radius of 20-30 m. The boat operator monitors geographic position, and supplies the divers with new fish for release as needed. A dive flag is displayed throughout. If the boat operator loses sight of the divers’ bubbles, he/she motors at idle speed into the wind constantly scanning the area until the divers surface. The boat operator keeps track of vessels in the vicinity, and wards off any vessels approaching too close to the divers.
13. APPENDIX H - IDAN 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:
Country:

__________________________________________________________
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
In Training Open Water
Advanced
Divemaster
Instructor
Technical
Commercial

Experience:
Years diving:
Total no. of dives:
Total dives in last 12 months:

Outcome:
Fatal
Non-Fatal

__________________________________________________________
REPORTED BY:
Name:
Contact Ph:
Email:
OHS001

OHS Hazard, Incident, Injury and Illness Report Form

Use this form for reporting OHS hazards, incidents, injuries, illnesses, or issues at UNSW. Refer to the OHS Hazard, Incident, Injury and Illness Report Procedure before completing this form.

PART A  To be completed by the person reporting

Personal Details

Title: [ ] Employee  [ ] Student  [ ] Contractor  [ ] Visitor
Family Name:  First Name:  Staff/student no.:

Home Address:

Email:  Phone (w):  Phone (h):

Faculty/Division:  School/Unit:

Position:  Gender:  [ ] Male  [ ] Female

Supervisor:  Phone:  email:

Report details

Tick one box only

[ ] Hazard
[ ] Incident with work related injury
[ ] Incident with work related illness
[ ] Other, please specify:
[ ] Incident with no injury or illness (e.g. a near miss)
[ ] Injury related to travel to or from work
[ ] Issue for resolution at local OHS committee

Date issue identified/injury occurred:

Time issue identified/ injury occurred:

Attach separate sheet if further space required for questions (1) to (8)

(1) Describe the Hazard, incident or illness:

(2) Were there any specific injuries and symptoms? (include parts of body affected, left or right side etc.):

(3) Did you have any time off work?  Yes  [ ]  No  [ ]
If yes specify dates:

(4) Did your normal work need to be altered due to injury?  Yes  [ ]  No  [ ]
Is it still altered?  Yes  [ ]  No  [ ]

(5) Did you see a doctor?  Yes  [ ]  No  [ ]

(6) Did you obtain a medical certificate?  Yes  [ ]  (please attach) No  [ ]

(7) Have there been costs associated with this injury?  Yes  [ ]  No  [ ]
If yes specify:

(8) Was there a witness?  Yes  [ ]  No  [ ]
Name of Witness:

Witness contact details

Phone:  Email or Address:

Location of Incident/Hazard (attach Google® Map if applicable and available):

Building:  Floor:  Room:

External Location, if applicable:

Signature

I approve the release of the information in this form to approved authorities, which may include medical practitioners, legal representatives, employee associations, insurance companies and WorkCover NSW.

Your signature:  Date forwarded to Supervisor:

Send Part A to:

(1) If reporting an injury/illness it must be reported to OHS and Workers compensation within 48 hours. Therefore send original to OHS Workers Compensation Manager and give a copy of both part A and B to your Supervisor. Keep a copy for yourself.

(2) If reporting a hazard give the original to your supervisor. Keep a copy for yourself.

You will be advised by your supervisor once all required corrective actions have been implemented.
Name of Person Reporting Incident: ___________________________ Date of Incident: ___________________________

**PART B To be completed by the supervisor**

This section is to be completed by the Supervisor as soon as possible in response to receiving Part A. Refer to the OHS Hazard, Incident, Injury and Issue Report Procedure before completing this form.

Serious hazards, incidents, injuries, illnesses and issues must be notified immediately to the OHS&WC Unit by phone on 9385-2214.

### Assess the risk

**What is the identified hazard?**

**What is the harm (consequence of the hazard) which needs to be controlled?**

The risk rating of a hazard is based on a combination of Consequence and Likelihood. Please complete the following table by referring to the UNSW Risk Rating Procedure. Circle one option only in each section below.

<table>
<thead>
<tr>
<th>Consequence</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Likelihood</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Action required:</th>
<th>Very High: Act Immediately</th>
<th>High: Act Today</th>
<th>Medium: Act This Week</th>
<th>Low: Act This Month</th>
</tr>
</thead>
</table>

### Corrective Action Plan

The supervisor is responsible for ensuring corrective actions are entered on the local Corrective Actions Register, completed and notifying the person completing Part A. The Head of School/Centre/Unit is responsible for supervisors completing corrective actions in a timely manner.

Corrective Actions to be taken (must be used in this order where possible)

<table>
<thead>
<tr>
<th>Corrective Actions to be taken (must be used in this order where possible)</th>
<th>By whom</th>
<th>By when</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eliminate the hazard or risk by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substitute with something less hazardous:</td>
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<td></td>
</tr>
<tr>
<td>Engineering controls (e.g. hand truck, trolley, machine guarding, fume cupboard):</td>
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<td></td>
</tr>
<tr>
<td>Administrative controls (signage, safe working procedure, risk assessment, training):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Protective Clothing &amp; Equipment:</td>
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<td></td>
</tr>
</tbody>
</table>

A combination of the above measures may be required to be taken to minimise the risk to the lowest level reasonably practicable if no single measure is sufficient for that purpose.

Please explain why you have not used controls higher up the hierarchy of risk controls if applicable:

**Supervisors Signature**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Signature:</th>
<th>Date:</th>
</tr>
</thead>
</table>

### Send copies to:

Copies of this form with all required details completed are to be sent by the supervisor to:

1. Chairperson of local School/Unit OHS Committee
2. Manager, OHS&WC - fax 9385 2365
3. OHS Coordinator for your Faculty

For incidents requiring action by Facilities Management ring FM Help Desk on ext 55111

<table>
<thead>
<tr>
<th>Job Number:</th>
<th>Date Job Request Placed:</th>
<th>Date Completed:</th>
</tr>
</thead>
</table>
## 15. APPENDIX J – REGISTERED OCCUPATIONAL DIVING MEDICS IN METROPOLITAN SYDNEY

SOUTH PACIFIC UNDERWATER MEDICINE SOCIETY.
Registered Occupational Diving Medics.

<table>
<thead>
<tr>
<th>NAME:</th>
<th>ADDRESS:</th>
<th>PHONE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Priti Bhatt</td>
<td>Suite 506 Level 5, 74 Pitt Street Sydney</td>
<td>02 9965 3723</td>
</tr>
<tr>
<td>Dr Susan Willis</td>
<td>University Health Service University of Sydney SYDNEY</td>
<td>02 9351 3484</td>
</tr>
</tbody>
</table>
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: Coastguard 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.
## Recommended Delay Before Exposure to Altitude

### Table: Minimum Delay Before Exposure to Altitude

<table>
<thead>
<tr>
<th>Altitude (meters)</th>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 150</td>
<td>Nil</td>
<td>Nil</td>
<td>2</td>
</tr>
<tr>
<td>150 – 600</td>
<td>Nil</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>600 – 2 400</td>
<td>12</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>Greater than 2 400</td>
<td>24</td>
<td>48</td>
<td>72</td>
</tr>
</tbody>
</table>

**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
- Mount White (F3, near Gosford) is approximately 300 meters above sea level.