

School of BEES

DIVING OPERATIONS MANUAL

This is a working document and subject to change

Diving Safety Committee

May 2019

**Document History**

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# GENERAL

## INTRODUCTION

The purpose of the Diving Operations Manual is to ensure all scientific diving operations at UNSW Australia will be conducted according to AS/NZS 2299.2 Occupational diving operations - Scientific diving, the Work Health and Safety Regulation 2017, and the Work Health and Safety Regulation 2017 Exemption Order No. 015/17, and the UNSW Diving procedure. This manual, in conjunction with UNSW Risk Management procedures, identifies hazards, mandatory risk controls and recommends actions to manage the risk of underwater diving. See Section 1.6 for a detailed list of supporting documents.

## SCOPE

This document applies to employees, students, visitors and volunteers within the School of Biological, Earth and Environmental Sciences (BEES) who are conducting diving operations using compressed air, for scientific research or educational purposes. The manual also applies to BEES employees and students when they are diving for the purpose of UNSW work and study through other institutions and organisations. Provision is made for engaging with contractors.

Diving operations shall only be authorised when:

1. The dive does not involve planned decompression stops.
2. The maximum depth does not exceed 30 metres.
3. Using air or enriched air up to 40% oxygen with a partial pressure less than 1.4.
4. The dive does not involve “Cave diving” as defined by the Cave Diving Association of Australia (<http://www.cavedivers.com.au/>)

The Diving Operations Manual is reviewed by the Diving Safety Committee with recommendations put forward to the School of BEES Head of School for approval.

Variations to procedures may only be permitted upon consultation with the Dive Officer and Diving Safety Committee. Any such changes in conditions must be agreed upon in writing by all parties.

## DuTY OF CARE AND LEGAL RESPONSIBILITIES

Diving is hazardous, however appropriate controls including education, training and teamwork will lower risk. This manual is to be used as a management document. If all procedures are followed, any foreseeable risks to health and safety will be managed to as low as reasonably practicable.

1. Each person must co-operate with the UNSW Diving Procedures as well as the procedures outlined in this manual.
2. Each person has duty to take reasonable care for their own health and safety, as well as for the health and safety of other personnel working within the same environment. Reporting unsafe practices or equipment is the responsibility of every member of the team.
3. Each person must comply with any reasonable instruction given to them by responsible persons carrying out their assigned role in implementing this manual.
4. The nominated Dive Coordinator for a field trip is responsible for the entire Dive Team during the period in which that Dive Team is under their control, however it must be noted that risk assessment is the responsibility of all team members. If weather conditions, environmental factors, equipment or personnel are considered by any member of the team to create an unsafe working situation, then the diving operation must not continue until the situation is made safe to the satisfaction of the entire team.
5. All tasks undertaken must be within the experience and training of the diving personnel concerned, and the capacity of the equipment available.

## Disiplinary procedures

Individuals or groups who fail to follow safe diving practices as outlined by this manual, or as directed by the Dive Officer, may be legally responsible and liable for their actions or inactions and be subject to UNSW disciplinary or misconduct proceedings.

If the Dive Officer becomes aware that an individual or group has failed to adhere to the procedures outlined in this Operations Manual, the relevant standards, or legislation, or that they have otherwise dived in an unsafe manner; they should discuss their concerns with the individual in the first instance. If deemed necessary, the Dive Officer should advise and discuss the concerns with the individual’s supervisor and/or the Diving Safety Committee. The Dive Officer and the Diving Safety Committee will then investigate the circumstances and may refer the matter to the BEES Head of School if deemed necessary, with a recommendation for action, which may include suspension or cessation of diving operations by the individual concerned.

The Dive Officer has the right to suspend any diving operation they view as unsafe until a proper investigation can be conducted.

## DEFINITIONS

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.

A glossary of dive-related terms can be found in Appendix A.

## REFERENCED DOCUMENTS

The following publications are referred to in this manual.

1. AS/NZS 2299.1:2015 Standard operational practice
2. AS/NZS 2299.2:2002 Scientific diving
3. AS 2815 series Training and certification of occupational divers.
4. AS 4005.2:2000 Training and certification of recreational divers – Recreational SCUBA dive supervisor
5. Work Health and Safety Regulation 2017 (NSW)
6. Work Health and Safety Regulation 2017 Exemption Order No. 015/17
7. UNSW Diving Procedure
8. HS406 UNSW Fieldwork Guideline
9. HS801 UNSW Contractor Safety Management Guideline

Copies of these and other referenced documents are available for reference from the Dive officer.

# PERSONNEL

## Person conducting a business or undertaking (PCBU)

The School of BEES shall:

1. Appoint a Dive Officer in writing;
2. Appoint and consider recommendations made by the Diving Safety Committee;
3. Implement a management process to ensure that all diving activities are compliant with the relevant Acts, Regulations and Standards;
4. If using contractors, adhere to the HS801 UNSW Contractor Safety Management Guideline.
5. If using contractors, ensure the contractor complies with the WHS Regulation 2017 (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).

## DIVING Safety COMMITTEE (DSC)

The DSC provides specialist advice on the University of New South Wales diving policy and procedures and provides safety management for scientific divers. The committee shall include the Dive Officer/s, a health and safety representative and current researchers and students involved in diving.

The DSC shall:

1. Review relevant legislation and standards;
2. Develop and review the UNSW Diving Procedure and BEES Diving Operations Manual;
3. Assist the Dive Officer to manage or resolve identified hazards;
4. Provide specialist assistance in the investigation of all diving incidents/accidents;
5. Report to the BEES Head of School.

## DIVE OFFICER (DO)

The DO is responsible for administering and managing all diving operations, and ensuring compliance with relevant legislation, standards and procedures.

The DO has the authority to restrict, prohibit or suspend any diving operations or practice which he or she considers unsafe. Furthermore, they can insist on the implementation of additional safety practices, procedures or equipment they consider necessary to ensure the safety of the participants.

Training and qualifications:

1. Be trained to a level equal to or exceeding that specified in AS2815.1;
2. Have at least 100 hours of underwater diving experience;
3. Satisfy any other reasonable requirements as specified by the organisation.

Restrictions:

The DO must only approve dive operations within their qualifications, training and experience.

Responsibilities:

1. Be familiar with any legislation, standards and UNSW procedure which may apply to the diving operations, and ensure compliance with the requirements of this manual;
2. Manage the Diver Register to ensure currency of qualifications for all active divers;
3. Conduct diver inductions and check-out dives and ensure all dive team members are trained and qualified for the tasks they intend to participate in;
4. Appoint Dive Coordinators and ensure that they understand and acknowledge their responsibilities;
5. Provide advice in planning and managing risk for diving operations;
6. Evaluate and approve dive plans and risk management documents;
7. Supervise the use and maintenance of the University-owned dive equipment, and prohibit the use of equipment past its service date or which they consider unsafe;
8. Maintain records of all inductions, check-out dives, dive plans, risk assessments, dive logs, incident records and any maintenance or repair of equipment;
9. Provide reports on diving operations including all accidents/incidents to the DSC and BEES Head of School annually and as requested.

## DIVE COORDINATOR (DC)

A DC appointed by the dive officer shall be present onsite during diving operations. The DC 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, the WHS Regulation 2017, the UNSW Scientific Diving Procedure and this manual. The DC may also perform other duties such as Dive Attendant or Boat Master providing it doesn’t compromise their supervisory duties. For very low risk work in sheltered environments the DC may be approved by the DO to act as Diver provided that several restrictions and conditions are observed (see Section 4.1)

Training and qualifications:

1. Meet all the requirements of Scientific Diver in section 2.6;
2. Have at least 15 logged hours of scientific diving or occupational and have experience in the diving, equipment and procedures used in the diving operation to be performed;
3. Be able to recognize and manage diving emergencies and conduct pre-dive risk assessments;
4. Be familiar with this manual and ensure diving operations are carried out in accordance with its requirements;
5. Pass a DC induction and assessment with the DO which involves demonstrated competence to coordinate dive operations including management of risk, provide safety briefings, efficiently use DCIEM tables, comply with this manual and related standards and regulations and effectively identify and manage diving emergencies;
6. Satisfy any other reasonable requirements specified by the DO;
7. Be appointed in writing at the discretion of the DO to supervise diving operations.

Note: The DC may require reassessment of knowledge and competency after a 12-month period of inactivity as a DC or at the discretion of the DSO.

Restrictions:

Only coordinate dive operations within their training and experience as approved by the DO. The DO has the authority to restrict the activities of the DC according to their training and experience.

Responsibilities:

1. Ensure that the Dive Plan has been approved by the DO, the University has been informed through a Field work Notification and that call-back procedures are in place;
2. Ensure that all safety equipment (first aid kit, oxygen safety kit, dive flag, and means of communications) is available at the dive site and that it is within service dates and in working order;
3. Ensure every diving operation is performed in accordance with the approved Dive Plan, and seek DO approval for any changes prior to diving;
4. Ensure that all individuals in the dive team are sufficiently trained and experienced to perform all required tasks safely
5. Conduct a pre‐dive briefing in the presence of the entire dive team, and ensuring everyone is fully aware of their tasks for the dive, the risks and controls, dive buddy teams and emergency procedures;
6. Conduct the onsite risk assessment with the entire dive team and discussing all necessary control measures;
7. Ensure the Dive Log is completed including the head count for each dive before leaving the site;
8. Restrict or suspend any operation considered unsafe for any reason including environmental conditions;
9. Coordinate any emergency situation and follow appropriate emergency procedures;
10. Consult with divers on their fitness post dive and notify the DO as soon as possible of any diving‐related injury or incident that involves any member of the dive team, and complete an accident/incident report through MyUNSW;
11. Ensure all University dive cylinders are filled, and that all University dive equipment is cleaned and returned by the end of the day, unless by prior arrangement with the DO;
12. Ensure all dive paperwork is returned to the DO within 72 hours, or as soon as practical, upon return from the dive trip.

## DIVE LEADER

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

* 1. The dive coordinator or a person appointed by the dive coordinator; or
  2. 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.

## SCIENTIFIC DIVER

Training and qualifications:

1. Be at least 18 years of age;
2. Hold the following dive qualification:
   1. A certificate for general diving work that includes the type of general diving work to be carried out by the person. In the case of scientific diving at the University of New South Wales, this must be a ‘Scientific Diver’ qualification from one of the recreational agencies accredited to deliver ‘Perform diving for scientific purposes’ or an ADAS qualification (Part1R or higher) or equivalent OR;
   2. A ‘Recreational Supervisor’ certification, 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);*
3. Be certified medically fit to dive by a practitioner trained in underwater medicine as per AS/NZS2299.1:2015 in the last twelve months;
4. Have at least 15 hours of underwater diving experience after initial certification;
5. Have completed an induction and check-out dive with the DO or delegate.
6. All divers must have, through training, qualification or experience, acquired sound knowledge and skill in relation to the following:
7. The application of diving physics,
8. 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,
9. The use of decompression tables or dive computers,
10. Dive planning,
11. Ways of communicating with another diver and with persons at the surface during general diving work,
12. How to safely carry out general diving work of the type proposed to be carried out,
13. Diving physiology and first aid.

Restrictions:

Dive within their training and experience as approved by the DO. The DO has the authority to restrict certain activities of the diver if they deem them not to have the appropriate training and experience.

Responsibilities:

1. Abide by the procedures for diving as prescribed in AS/NZ2299.2, the WHS Regulation 2017, the UNSW Diving Procedure and this manual.
2. Have full understanding of the dive plan and tasks prior to diving;
3. Dive in strict accordance with the dive plan and follow the instructions of the dive coordinator and dive leader;
4. Act as a buddy diver as necessary and maintain effective communication with them at all times, and be able to render assistance;
5. Assist others and follow directions of the DC in the event of an emergency;
6. Ensure they have all equipment required in this manual, that it is in service and that it has been checked for functionality prior to each dive. They must notify the DC of any equipment fault or failure;
7. Ensure they are medically and physically fit for each dive;
8. Notify the DC and DO as soon as possible of any diving related injury that occurs to them or their buddy during diving operations;
9. Maintain an up to date dive logbook.

## RESTRICTED sCIENTIFIC DIVER

Restricted scientific divers are diving under the Work Health and Safety Regulation 2017 Exemption No. 015/17 which can apply to students and volunteers (see Appendix B). These students and volunteers are exempt from the requirements of Clause 171 of the WHS Regulation 2017 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) of this standard.

Training and qualifications:

1. Be at least 18 years of age;
2. Hold an open water certificate from a recognised SCUBA training and certifying organisation;
3. Be certified medically fit to dive by a practitioner trained in underwater medicine as per AS/NZS2299.1:2015 in the last twelve months;
4. Have at least 15 hours of underwater diving experience after initial certification;
5. Have completed an induction and check-out dive with the DO or delegate.

Restrictions:

1. Only dive when conditions are suitable for untethered SCUBA mode;
2. Not dive deeper than 18 m depth;
3. Not act as a standby diver unless they have a Rescue certification;
4. Not act as a dive leader;
5. Not use powered tools or lift bags;
6. Must be directly supervised by an unrestricted diver in the water.

Note: To act as a standby diver they must provide evidence of appropriate competencies outlined in Perform Diver Rescue (SISOSCB306A) or equivalent. They must also have the competencies regarding diver emergencies evaluated by the DO.

Responsibilities:

As per Scientific Diver (see Section 2.6).

## Visiting Scientific Diver (Limited Scientific Diving)

### A visiting scientific diver who is not a permanent resident in Australia and who does not meet all the requirements of a Scientific Diver, may dive as a Limited Diver. They must meet the following requirements:

1. Be certified medically fit to dive by a practitioner trained in underwater medicine as per AS/NZS2299.1:2015 in the last twelve months;
2. Through training, qualification or experience acquired sound knowledge and skill in relation to the following:
   1. The application of diving physics;
   2. 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;
   3. The use of decompression tables or dive computers;
   4. Dive planning;
   5. Ways of communicating with another diver and with persons at the surface during general diving work;
   6. How to safely carry out general diving work of the type proposed to be carried out;
   7. Diving physiology and first aid.
3. Have relevant diving experience, including relevant diving experience obtained outside Australia. Have 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.
4. Have completed an induction and check-out dive with the DO or delegate.

Restrictions:

1. Not dive deeper than 30 m depth;
2. Not conduct decompression diving;
3. Not use mechanical lifting equipment or a buoyancy lifting device;
4. Not dive beneath anything that would require the diver to move sideways before being able to ascend;
5. Not use plant that is powered from the surface;
6. Not diving for more than 28 days during a period of 6 months.

Responsibilities:

As per Scientific Diver (see Section 2.6).

## 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 2017.
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 2017 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 C.

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.

## Surface support person

### Availability and knowledge

When the Dive Coordinator has entered the water in lieu of supervising from the surface, a competent Surface Support person should stay at the surface to help divers, as well as assist in the event of an emergency. The Surface Support:

1. should be competent to administer cardiopulmonary resuscitation (CPR) and oxygen resuscitation;
2. shall have a working knowledge of the dive plan and tasks to be performed underwater;
3. should have knowledge of any signals, dive tables and equipment in use;
4. if tending a diver’s lifeline, shall be deemed competent by the DO and be familiar with the lifeline signals used.
5. should not be engaged in any task other than that of the Surface Support with the exception of skippering the dive vessel or tending a lifeline while the dive team is in the water or under pressure.

### Responsibilities

1. Assist with the deployment and recovery of divers, equipment and samples as required;
2. Assist in an emergency according to emergency plan;
3. Establish and maintain a constant look-out over any divers in the water;
4. Promptly and accurately fill in the Dive Log;
5. If tending a diver's lifeline, maintain the ability to communicate with the diver by means of that lifeline.

## Emergency call person

### Availability and knowledge

During Sheltered Conditions (see clause 4.2), an Emergency Call Person may assist on dives to provide third party assistance in lieu of the Surface Support person. They remain at the surface to help divers, as well as assist in the event of an emergency. The Emergency Call Person:

1. Should not be engaged in any task other that of Emergency Call person with the exception of skippering the dive vessel while the dive team is in the water or under pressure;
2. Shall be briefed on the Emergency plan including emergency contacts and procedures.

### Responsibilities

1. Assist with the deployment and recovery of divers, equipment and samples as required;
2. Establish and maintain a constant look-out over any divers in the water;
3. Assist in an emergency according to emergency plan.

## STANDBY DIVER (Buddy diver)

### Tethered diving

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:

1. in an emergency; or
2. 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.

### Non-tethered diving

Free-swimming divers shall form buddy teams of two or three divers and must maintain visual contact with, and direct access to, each other. Dive buddies should stay within a distance so that they can render immediate assistance.

## Nominated call back

Nominated call-back contacts are individuals who the DC contacts with updates of the status of the diving operation and notifies them of the safe conclusion of the day's diving operations. Nominated call-back contacts must understand and agree to the following responsibilities prior to diving taking place:

1. To be accessible by agreed means at the agreed times, and should be available through the agreed means throughout the dive operation;
2. Must have knowledge of the missed contact procedures (to be agreed between the DC and the call-back before commencement of the fieldwork);
3. Must have a copy of the fieldwork notification and dive plan to be able to provide details to the relevant authorities should an emergency arise.

## dIVER REGISTRATION

All individuals wishing to register as a diver at the University must be approved by the DO. The diver must complete the Diver Registration Form (Appendix D) and submit the relevant certifications and evidence of logged dives. The DO will conduct an induction and assess their diving competencies on a checkout dive.

At the discretion of the DO, a letter of reciprocity from a dive officer at another institution may be accepted in lieu of the registration and check-out dive. All contractors should be registered at their home institution.

At the discretion of the DO, divers who have not dived for an extended period of time (6 months or more), those who wish to dive to increased depths, or those who wish to use new tools or techniques may be required to perform a series of ‘work up’ dives which will focus on developing the skills, techniques, and experience of the diver.

## FIRST AID for diving teams

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

1. Control bleeding;
2. Administer 100% oxygen to spontaneously breathing patients and oxygen-enriched resuscitation to non-breathing patients using the oxygen resuscitation equipment at the dive site;
3. Care for an unconscious patient; and
4. Carry out cardiopulmonary resuscitation.

The above requirements are usually met by a first aid course leading to certification, incorporating or supplemented by an oxygen administration course.

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. Due to the responsibilities of the DC, they must keep their competencies current on any dives they are supervising.

First aid should be recertified every three years. CPR and oxygen provision should be recertified every year. At the discretion of the DO, divers may demonstrate competency in CPR and oxygen resuscitation skills in lieu of annual recertification. The skills must be assessed by a first aid instructor or relevant medical practitioner. In this instance, CPR and oxygen resuscitation skills must be officially recertified every 3 years.

# DIVE PLANNING AND RECORDS

## GENERAL

Dive planning is important to identify safety issues and to mitigate the risks associated with these activities. More detailed guidance on the processes of hazard identification, risk assessment and risk control can be found in Appendix E.

The University uses the following forms to assist in dive planning and reporting. Dive Coordinators have the primary responsibility for completing the forms, but they are encouraged to consult with their dive team and the DO during the process.

## fieldwork notification

A Fieldwork Notification must be submitted to BEES HS management prior to any field work taking place. The purpose is to notify BEES management of the location and specifics of intended work so that they can quickly contact, locate or inform authorities of the whereabouts of their staff and students if necessary. Field work notifications should be sent to **bees-fieldwork@unsw.edu.au** and include your supervisor, the Dive Officer, all participants, the nominated call back and any other relevant staff e.g. Boating or Snorkelling Officer.

## DIVE Plan – See Appendix f

The Dive Plan is comprised of the following:

1. Dive Plan -details of location of diving operations and dive team
2. Risk Assessment - identify possible hazards and precautions to be taken
3. Emergency Plan - identify emergency facilities and procedures

The Dive Plan must be approved by the DO before every diving operation. It should be submitted with sufficient time to adopt any changes by the DO (a minimum of 2 days prior to the first dive). The DC must ensure that the Dive Plan is followed and that any changes to the plan are approved by the DO prior to the dive commencing. The DC must ensure that a copy is present at the dive site and that all members of the dive team are familiar with it.

## OnSite Pre-Dive Plan and Risk Assessment – see Appendix G

### 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 Onsite Pre-Dive Plan and Risk Assessment must be lodged with the Dive officer on return to The University of New South Wales. The forms should be returned to the DO within 3 days of diving.

## Dive Log– see Appendix H

The DC must ensure that all details of the Dive Log are completed after each dive and before any subsequent dives are carried out. Prior to entering the water, each diver must sign that they have completed their safety checks. At the completion of each dive, the return of each diver shall be verified by the diver and the DC, 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. The forms should be returned to the DO within 3 days of diving.

## Diver’s Logbook

All divers must keep and maintain a record of their occupational dives as per the requirements of AS2299.2. This normally takes the form of a log book. It is important that divers maintain this record as it may be requested during a medical examination or needed to show competence in future diving operations.

# DIVE PROCEDURES

## dIVE tEAMS

Dive teams must include a Dive Coordinator and should comprise

1. Two divers and a competent surface support; OR
2. Three divers and a competent surface support; OR
3. More than three divers grouped into buddy pairs (preferably) or trios, but no more, and one competent surface support; OR
4. When diving in ‘Sheltered Conditions’ divers are permitted to dive without a surface support (i.e. in a team of two divers).

## Sheltered conditions

The sheltered water conditions must be assessed during the On-site Risk Assessment to ensure they are all met.

### The following conditions must be met:

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. **Daylight hours.**
6. **Divers must carry a portable surface marker buoy whilst at pressure and stay within 10 meters of it.**
7. **Third party assistance is readily available in an emergency.**

Third party assistance may include the public or an Emergency Call Person (see section 2.10).

If relying on the public as third-party assistance, the divers must contact the nominated call-back person immediately prior to entering the water with an expected time of surfacing and then immediately after exiting the water.

## Check out dives

The DO must ensure that there is at least one other person trained in rescue techniques, first aid and oxygen provision available during in-water training and inductions. The DO may need to bring surface support or additional divers to ensure this is met.

## 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

## use of decompression tables

All dives including repetitive dives must be calculated using DCIEM tables (including the DCIEM Short Tables) unless permission has been granted from the DSC to use an alternative. A copy of the DCIEM tables can be viewed at: <https://www.bees.unsw.edu.au/scientific-diving>

Dive computers may be used for the diver’s own information.

## Ascent rate and safety stop

The rate of ascent should be 18 metres ± 3 metres per minute. On each dive, divers should do a safety stop of at least 3-5 min between 3-5 metres. A safety stop is recommended for all dives deeper than 12 metres.

## Repetitive diving

A repetitive dive is any dive conducted within 18 hours of a previous dive, or that has a Repetitive Factor greater than 1.0 when calculated using the DCIEM tables.

**Adjustments for Multiple Repetitive Dives:**

Whenever a diver conducts three or more dives in a series and the surface interval is less than 6 hours, the repetitive group (RG) for each repetitive dive must be higher than that of the preceding dive.

If your RG is lower than or the same as that of the preceding dive and the surface interval before your next dive is less than 6 hours, make the following adjustment:

* Add one letter to the RG from the preceding dive and apply the adjusted RG to your current repetitive dive.

Example: First dive RG = ‘D’, second dive RG = ‘B’, less than 6 hours before 3rd dive

⇨ Raise the second dive RG letter to ‘E’ (First dive RG ‘D’ + 1 letter)

⇨ No need to adjust RG on 3rd dive if it is the last dive of the day (surface interval is greater than 6 hours).

**Reverse Profiles:**

A reverse profile of more than 12 meters is not recommended (e.g. first dive to 6 metres then second dive to 19 metres).

**Multi-day Repetitive Dives:**

If 3 or more dives a day are conducted on 3 consecutive days, allow for a 24-hour surface interval after the 3rd day.

## Remote area adjustments to dive times

Maximum bottom times and repetitive groups must be reduced based on the distance to the closest recompression chamber according to Table 1A and Table1B. Transport time must be realistically assessed by the DC. Local Emergency Service providers and the Divers Alert Network may be consulted to provide transport time information.

Table 1A: Maximum bottom time depending on the level of recompression chamber support.

|  |  |  |
| --- | --- | --- |
| **Maximum Dive Depth**  **(metres)** | **Maximum Bottom Time, in minutes** | |
| Column A  (chamber within 2 hours) | Column B  (chamber exceeds 2 hours) |
| 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 |

Table 1B: Maximum repetitive group for repetitive dives depending on the level of recompression chamber support.

|  |  |  |
| --- | --- | --- |
| **Maximum Dive Depth (metres)** | **Maximum Repetitive Group** | |
| Column A  (chamber within 2 hours) | Column B  (chamber exceeds 2 hours) |
| 6 | H | G |
| 9 | H | G |
| 12 | H | G |
| 15 | G | F |
| 18 | F | E |
| 21 | E | D |
| 24 | E | D |
| 27 | D | C |
| 30 | D | C |

## diving before and after travel

1. Diving after Travel

The diver shall have had adequate rest before diving.

1. Travel after Diving

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). Table 2 shows a list of the minimum delay times which should be observed relative to altitudes.

**Table 2 Recommended Minimum 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 ≤50% of the DCIEM no-decompression limit or two short dives within 18 h with a total, combined bottom time of ≤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 ≥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.

NOTE: 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.

SYDNEY METROPOLITAN AREA:

1. Mount Ousley (Wollongong) is approximately 440 meters above sea level. Travelling south from Sutherland on the Princes Highway the elevation gradually increases with Heathcote being approximately 200m and Helensburgh being approximately 300m.
2. Mount White (F3, near Gosford) is approximately 215m above sea level.
3. Some areas in Sydney are over 150m above sea level including but not limited to Castle Hill, Pennant Hills, Terry Hills, St Ives and Frenchs Forest.

It is the responsibility of each diver to ensure they take the necessary delay before travelling to altitude.

## boat diving

1. The master of the vessel must be inducted into the BEES boating policy and procedures and have a good working knowledge of the vessel.
2. The master must stay with the vessel at all times.
3. The master shall meet the requirements of the Surface Support or Emergency Call Person as appropriate, if they are the only person on the vessel.
4. Live diving operations are discouraged, and special consideration must be sought to use this practice unless in an emergency.

## Night diving

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

1. The entry and exit points shall be adequately and distinctively illuminated
2. 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.

## Blue water diving

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

## Enriched Air Nitrox diving (EANx)

Diving using EANx (Nitrox) can be used in two ways. It can be used to increase the safety margin if used with standard air dive tables. It can also be used to increase dive times and shorten surface intervals if used with Nitrox tables or Equivalent Air Depth (EAD) tables.

**Dive personnel:**

1. Divers intending to dive using Nitrox must hold an approved Nitrox Diver certification from a recognized diver training organisation and have logged at least five dives using Nitrox during or post-training.
2. Divers will be required to demonstrate competency in UNSW Nitrox procedures by the DO prior to diving using Nitrox.
3. Nitrox dives must be supervised by a DC with a Nitrox certification.
4. Nitrox dive paperwork requires approval from a DO with a Nitrox certification.

**Procedures:**

1. No dive shall be conducted with an oxygen partial pressure (PO2) greater than 1.4 at or with gas mixes containing more than 40% O2;
2. In mixed teams of Nitrox and air divers, observe the Maximum Operating Depth (MOD) of the richest mix and the decompression schedules of the air diver.
3. When using nitrox to increase the safety margin on air-based tables, the MOD, oxygen exposure and time limits for that Nitrox mixture must not be exceeded.
4. When using the equivalent air depth (EAD) method, the MOD shall be based on the PO2 for the specific Nitrox mix being used. When planning these dives, use the table given as appendix I to calculate the PO2 and EAD of your specific gas mixture, then calculate the decompression schedule using the equivalent depth from the standard DCIEM tables as for any air dive.
5. The MOD, oxygen exposure and time limits for the Nitrox mix must not be exceeded. The dives should comply with the DCIEM recommended time limits (Appendix I) and the NOAA Oxygen Exposure Limits (Appendix J).
6. As part of the pre-dive procedures, the DC must confirm the Air or Nitrox mixture of each diver and establish the maximum depth and time limits for each of the divers.
7. All nitrox divers must analyse their own gases and sign pre-dive gas check on the dive log.
8. Each diver must use a computer set to the Nitrox percentage and must continue to use that computer for the entire diving operation. Divers shall not share computers.

**Nitrox Equipment**

1. Because UNSW EANx diving is limited to mixes of ≤40% oxygen, oxygen clean equipment is not mandatory, however divers should check that their equipment is compatible with Nitrox.
2. Divers must hire appropriate cylinders from a reputable dive shop. Cylinders are marked with “NITROX”, or “EANx”, or “Enriched Air” and are green and yellow.
3. Oxygen analyser: An oxygen analyser is required which is capable of determining the oxygen content in the SCUBA cylinder. The analyser should be capable of reading a scale of 0 to 100% oxygen, within 1% accuracy. The analyser must be clearly labelled with its oxygen sensor/cell’s expiry date. UNSW teams wishing to use nitrox must provide information on their analyser and the age of the oxygen sensor to the DO.

Note: More Guidance on NITROX diving can be found in AS2299.1.

## diving reciprocity

### Divers from other institutions

When a dive operation is conducted by The University of New South Wales all divers must follow the UNSW Scientific Diving Procedure and this manual. Any divers from other organisations must meet the certification requirements in this manual and gain approval to dive from the UNSW Dive Officer. They shall provide a letter of reciprocity from their host institution’s Dive Officer certifying that the diver is currently authorised to dive at the host institution as well as copies of dive certifications, current occupational medical certificate and log book.

When UNSW workers are diving with film crew, that film crew must dive in a separate team and dive according to their own workplace requirements. When the film crew does not have their own team, they must become a registered diver at UNSW and dive according to UNSW procedure and this manual.

### Diving with other organisations

When the University of New South Wales divers participate in diving operations conducted by another institution, they must follow the UNSW Scientific Diving Procedure and this manual as well as the guidelines of the institution conducting the diving operation. Parties (including the DO) shall collaborate to resolve any inconsistencies between the organisations’ diving guidelines. The dive plan from the other institute must be checked by the UNSW Dive Officer prior to diving. The diving may be conducted using the host institute’s paperwork, but the UNSW divers must submit copies of the dive logs and any incidents to the UNSW Dive Officer afterwards.

## diving overseas

Divers participating in University related diving activities overseas should dive according to this manual and the diving must be approved by the Dive Officer. The dive plan from the foreign institute should be checked by the Dive Officer and special consideration should be made to ensure that safety measures are in place including the presence of safety equipment, recompression chamber support and an emergency plan. Any medical expenses associated with SCUBA activities conducted on behalf of UNSW will be covered under the UNSW travel insurance policy. Coverage is automatic and does not require any disclosure or extra payments. The insurance does not cover additional SCUBA activities as part of recreational activities.

## emergency procedures

A copy of the UNSW emergency procedures is included in Appendix K. A copy of the document is also found in all UNSW oxygen safety kits. The Dive Plan also contains the emergency plan specific to the dive operation. It is the responsibility of the DC to ensure that the entire dive team has a working knowledge of the emergency plan.

## Lost diver routine

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

1. 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.
2. 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.
3. Omit safety stops.
4. Deploy safety sausage, utilize whistle (or vocally question where diver is) and wait on surface for 4 minutes.
5. If lost diver is still missing, return to boat or shore and initiate emergency procedures, i.e. alert Diving Coordinator/ shore support, contact emergency services.

## incident reporting

All incidents, unexpected hazards, accidents and injuries will be reported as soon as possible the Dive 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 DO on return to the University. Refer to the University Emergency Action Plan (see Appendix K). 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 L.

All injuries, illnesses and incidents must be reported through the University's online reporting system at MyUNSW.

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 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.

# EQUIPMENT FOR DIVING

## EQUIPMENT STANDARDS AND MAINTENANCE

Ensuring that all equipment is in working order and that divers know how to properly use it is vital to dive safety. The Dive Coordinator is responsible for ensuring that all University and personal dive equipment used by their dive team, is in working order and meets the requirements in this manual. A record of maintenance of all personal dive equipment must be sent to the Dive Officer prior to the start of the operation. .

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

1. 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.
2. Examined, tested, serviced and repaired in accordance with the manufacturer’s recommendations or as specified in AS/NZS 2299.2:2002.

Records of maintenance and testing of The University of New South Wales and personal equipment used in diving operations will be kept by the Dive Officer for at least two years.

## FAULTY EQUIPMENT PROCEDURE

Any member of the dive team who becomes aware of equipment which is not functioning properly, or out-of-service, shall remove it from service using the following procedure:

1. Isolate and tag it out immediately. Out-of-service tags are kept in all Oxygen kits and in the Dive Room.
2. Inform the Dive Officer of the type of fault and location of tagged-out equipment immediately.

## Personal diving equipment

Each diver shall have the following equipment:

* + - * 1. Open-circuit SCUBA, complete with cylinder and two demand regulators;
        2. Face mask;
        3. Dive booties and fins;
        4. Snorkel for surface swimming;
        5. Weight belt with quick release closure, or a BCD incorporating an integrated weight system with quick release;
        6. A cylinder pressure gauge, depth gauge and timing device;
        7. Wetsuit or protective clothing appropriate to the condition of work and the temperature of the water;
        8. Buoyancy control device (BCD) with oral and scuba-feed inflators;
        9. Diver’s knife or line cutter;
        10. Emergency signalling equipment including Safety sausage and whistle;
        11. Shark shield (under certain conditions: See 5.5).

## Safety equipment for dive team

The following equipment must be available at the dive site:

1. Oxygen resuscitation equipment with sufficient supply to get a patient to medical care;
2. First aid equipment;
3. Dive flag;
4. Communications that will work at the proposed dive site (mobile phone with adequate reception, satellite phone or VHF radio);
5. Copy of dive plan and emergency procedures.

## SHark Shield use

When there is a higher than normal risk of shark attack, diving will be prohibited or will require the use of shark shields (see conditions below).

**No diving shall occur:**

for at least 24 hours within a 5km radius of where a dangerous shark (white, bull or tiger shark) has been reliably sighted. Dive coordinators shall, at a minimum, check the sharksmart app for their intended dive location prior to the dive.

**Shark shields are compulsory when SCUBA diving:**

1. at dawn and dusk (2 hours before and after sunrise and sunset);
2. in turbid low visibility waters (<4 meters);
3. within 500m of a river/estuary entrance or within an estuary of NSW from Wollongong to Tweed Heads during December to May (e.g. Sydney Harbour, Botany Bay, Broken Bay, Port Hacking);
4. in NSW from Yamba to Tweed Heads during June to November;
5. in South Australian and Western Australian waters;
6. with prolonged periods in mid-water or at the surface;
7. near deep channels or steep drop-offs;
8. while spearfishing or diving near spearfishermen;
9. while using burly or fish bait or diving near fishermen;
10. where there are signs of bait fish or fish feeding activity (e.g. diving seabirds);
11. within 1km of a seal colony at any time of the year;
12. within 5km of a seal colony during pupping season;
13. within 1km of a sewage outfall (e.g. Vaucluse and Diamond Bay) or an abattoir discharge;
14. solo (tethered).

NOTE: Shark shields must be switched on as soon as practicable on entering the water and remain on for the dive.

At all other times, the assessment to whether diving may be undertaken without a shark shield is the responsibility of the Dive Coordinator and should be done with the entire dive team. However, when the use of shark shields is not mandatory, each individual diver has the right to wear a shark shield and has the right to decide not to dive if they consider it unsafe. If one diver chooses to wear a shark shield, this will not affect the choice of the other divers.

NOTE: All dive teams must take shark shields to the dive site even if they think there will not be a higher than normal risk. A risk may not be apparent until the Onsite Risk Assessment is carried out (for example, the water may be turbid).

# APPENDIX A: GLOSSARY OF TERMS

Bottom time: The total time elapsed from when a diver leaves the surface to the time to when the final ascent is commenced. Bottom time is measured in minutes and rounded up to the next whole minute.

Breathing gas: The compressed gas intended for respiration by the diver.

Buddy diver: A member of a group of two or three divers who continually monitor and communicate with each other through visual or other means in order to render immediate assistance if required or in an emergency.

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.

DCIEM: The Canadian Defence and Civil Institute for Environmental Medicine.

DCIEM Tables:Decompression tables developed by DCIEM. To be used to manage all UNSW diving operations unless otherwise approved.

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 (AGE) 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.

Diving Safety Committee: An advisory committee that assists with the safety management of scientific divers within the University. The committee shall include the Dive Officer, a health and safety representative and current researchers and students involved in diving.

Dive coordinating position: A designated location on the surface from which the divers can be effectively monitored.

Dive coordinator: A person who supervisors and coordinates any dive and is responsible for the dive team safety. A dive coordinator is the HS representative in the field for a given trip.

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

Dive log: A designated UNSW form, used to record details of each dive for every diver on site.

Dive plan: A set of procedures specific to a given diving operation. A dive plan should include the dive profiles, details of the tasks, positions in the dive team, risk management, an emergency plan and all other relevant information. The dive plan must be approved by the Dive Officer prior to commencement.

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.

Dive officer: A person who has been nominated in writing by the employer and is ultimately responsible for all diving activities.

Dive 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.

Equivalent Air Depth (EAD): Equates a depth using a given concentration of Nitrox to an ‘Air’ depth, based on equivalent exposure to nitrogen.

Exceptional exposure dive: 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.

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.

MOD: Maximal depth for use of a nitrox mix, set by the partial pressure of oxygen at that depth. MOD limits for UNSW divers is 1.4bar

Nitrox: A breathing gas mixture where the fraction of oxygen is elevated compared to air. Use of this gas (also called Enriched Air Nitrox – EANx) requires additional training.

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. All diving approved by and conducted under the authority of UNSW is considered occupational diving, including diving performed by unpaid volunteers from outside the organisation.

On site pre-dive Plan and risk assessment: A designated UNSW form, used to make an assessment of risk on site before each dive.

Quick release mechanism: A readily operated mechanism that enables the immediate release, e.g. of diver’s equipment, from the secured position by the action of one hand, but which is designed to minimize the risk of accidental release.

Recompression chamber (RCC): A surface chamber in which a person 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.

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.

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.

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.

Visiting scientific diver: A diver who is not a permanent resident of Australia who is diving as a ‘Limited Diver’ according the WHS Regulations 2017.

# APPENDIX B: Work Health and Safety Regulation 2017 Exemption No. 015/17

**1. Name of Exemption**

This Exemption is *the Work Health and Safety Regulation 2017 Exemption Order No. 015/17.*

**2. Commencement**

This Exemption commences on 1 January 2018 and has effect until 31 December2022.

**3. Exemption**

The Applicant for this Exemption Order is the University of New South Wales.

This Exemption Order applies to diving activities undertaken by students and volunteer divers, who are authorised to undertake those diving activities 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

Those persons are exempt from Clause 171 of the Regulation, subject to the conditions in the Schedule to this Exemption Order.

**4. Definitions**

For the purposes of this Exemption:

**General diving work** means general diving work as defined in clause 5 of the Regulation.

**Volunteer diver** means a person who is acting on a voluntary basis and undertakes diving activities in order to assist Students, workers or others in the conduct of their research or education.

**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 with the institution.

(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, workers or others 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.

# APPENDIX C: 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:**

1. Each diver’s certificate of medical fitness
2. Each diver’s certificate of competency for the type of dive work to be undertaken.
3. Each dive supervisor’s qualification for the type of dive work to be supervised.
4. Each dive supervisor’s experience in the type of diving work to be supervised.
5. Evidence that the divers to be used are on the contractor’s dive register.
6. A Dive Plan stating at a minimum:
   * 1. The method of carrying out the dive work
     2. The tasks and duties of each person involved in the dive
     3. The diving equipment, breathing gases and procedures to be used in the dive
     4. As applicable, dive times, bottom times and decompression profiles
     5. Hazards relating to the dive and measures to be implemented in the control of risks associated with those hazards
     6. 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.

# APPENDIX D: DIVER REGISTER and IN WATER ASSESSMENT

|  |  |
| --- | --- |
| Name: | |
| Address: | |
| Date of Birth: | Phone number: |
| Status: Staff, Honors Student, Post Grad Student, Volunteer, Visiting Staff, Visiting Student, Contractor | |
| Supervisor: | |
| Next of Kin Name: | NOK Relationship: |
| NOK Phone Number: | NOK Email: |

UNSW HS modules

|  |  |
| --- | --- |
| Health & Safety Awareness (Course HSEAWA / Moodle HSEA0001) |  |
| Ergonomics & Manual Tasks (Course HSEEMT / Moodle HSEE0001) |  |

|  |  |  |
| --- | --- | --- |
| Diving Details (attach copies): | Details | Sighted by DSO |
| Highest Diving Qualification: |  |  |
| Apply First Aid: |  |  |
| Advanced Resuscitation:  (Oxygen Provider/CPR) |  |  |
| Additional Qualifications:  (Nitrox, Surf Life Saving etc) |  |  |
| Current Diving Medical:  (AS2299.1) |  |  |
| Number of Logged Dives: |  |  |
| Number of Logged Hours: |  |  |
| Statement of declaration for digital logs |  |  |



|  |
| --- |
| Any diving related accidents, incidents or injuries? |

|  |  |
| --- | --- |
| I have read and understood the BEES Diving Operations Manual, BEES RMF: Diving Activities, the WHS Regulation 2017 and the Scientific Diving Standard AS2299.2 | (Signature and Date) |

|  |  |
| --- | --- |
| Approved as: | Dive Coordinator, Scientific Diver, Limited Diver, Restricted Scientific Diver |
| DSO's signature and Date: |  |

# IN WATER DIVING ASSESSMENT

|  |  |
| --- | --- |
| Name: | Date: |

|  |  |  |  |
| --- | --- | --- | --- |
| Element | Criteria | Diver | Dive Officer |
| Use of Dive Tables | Demonstrate an understanding and application of decompression tables |  |  |
| Use of communication systems | Demonstrate hand signals, discuss means recalling divers |  |  |
| Use of underwater equipment | Fully assemble diving equipment and demonstrate comfort and familiarity with standard equipment |  |  |
| Lifting skills | Demonstrate safe and effective manual handling of heavy equipment |  |  |
| Shark shield use and care | Demonstrate proper use and care |  |  |
| Pre-dive checks | Demonstrate effective buddy checks |  |  |
| Post-dive checks | Demonstrate effective post dive checks |  |  |
| Fitness | Demonstrate an appropriate level of fitness including 400m swim and 10-minute tread water |  |  |
| Air management | Demonstrate ability to prevent exhaustion of air supply by monitoring air consumption and air supply |  |  |
| Diver skills | Demonstrate effective:   * mask removal and clearing * alternate air source recovery * buoyancy control |  |  |
| Navigational techniques | Demonstrate underwater navigation safely and effectively |  |  |
| Rescue and emergency skills | Demonstrate effective:   * management of ‘out of air’ emergency * retrieval of unconscious diver at depth * management of panicked diver at surface * rescue tow 100m * removal of unconscious diver from the water |  |  |
| Oxygen kit | Demonstrate safe set up and use |  |  |

# 

# APPENDIX E: HAZARD IDENTIFICATION AND RISK ASSESSMENT

Hazard identification and risk assessment should be performed at the dive plan 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

# APPENDIX F -DIVE PLAN 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: |  |

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 |  |

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 Diving Operations Manual? YES / NO Conditions must be assessed on site. If no, surface support required.

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 PLAN (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.

|  |
| --- |
|  |

1. *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 or Shipping | Yes / No | Noise | Yes / No |
| Restricted/Limited Divers | Yes / No | Altitude (eg Mount White and Mount Ousley) | Yes / No |
| Poor Visibility | Yes / No | Distance | Yes / No |
| Dangerous Marine Animals | Yes / No | Gases | Yes / No |
| Walls | Yes / No | Powered Tools | Yes / No |
| Overhead Environment | Yes / No | Other |  |

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

|  |
| --- |
|  |

EMERGENCY PLAN FOR DIVE PLAN (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: |  |

(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 Plan prior to diving and I will keep a copy on the dive site.

|  |  |  |  |
| --- | --- | --- | --- |
| Coordinator Signature: |  | Date: |  |
| Approved by DSO: |  | Date: |  |

# APPENDIX: G – ONSITE PREDIVE PLAN AND RISK ASSESSMENT

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

|  |  |
| --- | --- |
| Dive coordinator: |  |
| Date: |  |
| 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 / Initial** |
| 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, Shark shield |  |
| 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 |  |
| Boat Traffic or Shipping | Nil, Present, Port Traffic | VHF monitored, Lookout, Dive Flag, 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, Shark shield |  |
| 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? |  |
| Emergency Plan | Recompression Chamber available and location determined? |  |
| Emergency plan and procedures discussed with team? |  |
| Dive Plan | Dive Plan has been approved by DSO? |  |
|  | Authorities notified? |  |
| Safety Equipment | Oxygen checked and working? First aid kit? |  |
| Diver recall system? |  |
| Alternate exit established? |  |
| Mobile phone signal/charged? VHF working? |  |
| Has the need for shark shields been assessed using the parameters in the BEES SCUBA Operations Manual? |  |
| Pre-dive equipment checks? BWRAF. |  |
|  | Dive knives? Safety Sausages? |  |

SURFACE SUPPORT

|  |  |
| --- | --- |
| Is there surface support? | 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 portable dive flag to carry whilst diving? | YES / NO |
| Are third party assistance readily available (public or Emergency Call Person)? | 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:

|  |
| --- |
|  |

|  |  |
| --- | --- |
| *Do any divers have Residual Nitrogen (have they dived in the last 18 hours)?* | YES / NO |

If YES, calculate Dive Tables accordingly and ensure diver does not exceed approved dive plan.

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: |  |
| Name: |  | Signature: |  |

# APPENDIX H: UNSW AUSTRALIA DIVE LOG FOR AIR

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

**Pre** **Dive**: All safety equipment is present and oxygen contents have been checked as full.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Date | Location | Dive # | Name  and task | Depth | Bar  In | Bar Out | Time  In | Time Out | Bottom Time | RG | SI | RF | EBT (BTxRF) | Pre: Safety Checks  -Signature | Post:  Diver Well  -Signature |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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**Drills performed:**

Out of air. Missing diver search.

Remove unconscious diver from depth. Severe bleeding.

Remove diver from the water. DCI injury.

**Post Dive:** All dive team members are accounted for and debriefed.

O2 Kit dismantled and computers/compasses returned.

Equipment has been cleaned and returned.

Dive cylinders filled and returned.

Dive Coordinator’s signature and date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dive Officer’s signature and date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Any incidents, difficulty, injury or equipment problems that occurred on the dive:

**UNSW AUSTRALIA DIVE LOG FOR MIXED GASES**

snorkelers)

**UNSW AUSTRALIA DIVE LOG FOR MIXED GASES**

NOTE: Please name ALL persons in the dive team on this form (e.g. boat driver, surface attendant, snorkelers)

**Pre-dive:** All safety equipment is present and oxygen contents have been checked as full: **Location:** **Date:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dive # | Name  and task | Gas Mix | MOD | Depth | EAD | ppO2 | Bar  In | Bar Out | Time  In | Time Out | Bottom Time | RG | SI | RF | EBT (BTxRF) | Pre: Safety & Gas Checks  -Signature | Post: Diver well  -Signature |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Drills performed:**

Out of air. Missing diver search.

Remove unconscious diver from depth. Severe bleeding.

Remove diver from the water. DCI injury.

**Post Dive:** All dive team members are accounted for and debriefed.

O2 Kit dismantled and computers/compasses returned.

Equipment has been cleaned and returned.

Dive cylinders filled and returned.

Dive Coordinator’s signature and date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dive Officer’s signature and date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

:

**Any incidents, difficulty, injury or equipment problems that occurred on the dive:**

# APPENDIX I: NITROX DIVING: Equivalent Air Depth (EAD) and Partial Pressure of Oxygen (PO2)

This table has been adapted from Table 1 (N) in the DCIEM manual. The table has been modified to reflect UNSW maximum depth (30 metres) and maximum partial pressure of oxygen (1.4).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Actual Depth  (metres) | Mixture | | | | | |
| 40% O2 | | 36% O2 | | 32% O2 | |
| EAD (m) | PO2 (ATA) | EAD (m) | PO2 (ATA) | EAD (m) | PO2 (ATA) |
| 9 | 6 | 0.8 | 6 | 0.7 | 9 | 0.7 |
| 10 | 6 | 0.8 | 9 | 0.8 | 9 | 0.7 |
| 11 | 9 | 0.9 | 9 | 0.8 | 9 | 0.7 |
| 12 | 9 | 0.9 | 9 | 0.8 | 12 | 0.7 |
| 13 | 9 | 1.0 | 9 | 0.9 | 12 | 0.8 |
| 14 | 9 | 1.0 | 12 | 0.9 | 12 | 0.8 |
| 15 | 12 | 1.0 | 12 | 0.9 | 12 | 0.8 |
| 16 | 12 | 1.1 | 12 | 1.0 | 15 | 0.9 |
| 17 | 12 | 1.1 | 12 | 1.0 | 15 | 0.9 |
| 18 | 12 | 1.2 | 15 | 1.1 | 15 | 0.9 |
| 19 | 15 | 1.2 | 15 | 1.1 | 18 | 1.0 |
| 20 | 15 | 1.3 | 15 | 1.1 | 18 | 1.0 |
| 21 | 15 | 1.3 | 18 | 1.2 | 18 | 1.0 |
| 22 | 15 | 1.3 | 18 | 1.2 | 18 | 1.1 |
| 23 | 18 | 1.4 | 18 | 1.2 | 21 | 1.1 |
| 24 | 18 | 1.4 | 18 | 1.3 | 21 | 1.1 |
| 25 |  | | 21 | 1.3 | 21 | 1.2 |
| 26 | 21 | 1.4 | 24 | 1.2 |
| 27 | 21 | 1.4 | 24 | 1.2 |
| 28 | 21 | 1.4 | 24 | 1.3 |
| 29 |  | | 24 | 1.3 |
| 30 | 27 | 1.3 |

Note: Oxygen percentage in breathing gas is to be within +0.5% of the specified concentrations.

**APPENDIX J: NOAA Oxygen Exposure Limits (adapted from NOAA diving manual 4th edition).**

The table has been modified to reflect UNSW maximum partial pressure of oxygen (1.4). These limits must not be exceeded for any UNSW enriched air diving operation.

|  |  |  |
| --- | --- | --- |
| **NOAA Oxygen Exposure Limits** | | |
| **PO2**  **(atm)** | **Maximum minutes per Single Exposure** | **Maximum minutes per 24 hours** |
| **1.40** | 150 | 180 |
| **1.35** | 165 | 195 |
| **1.30** | 180 | 210 |
| **1.25** | 195 | 225 |
| **1.20** | 210 | 240 |
| **1.10** | 240 | 270 |
| **1.00** | 300 | 300 |
| **0.90** | 360 | 360 |
| **0.80** | 450 | 450 |
| **0.70** | 570 | 570 |
| **0.60** | 720 | 720 |

# APPENDIX K: EMERGENCY PROCEDURES

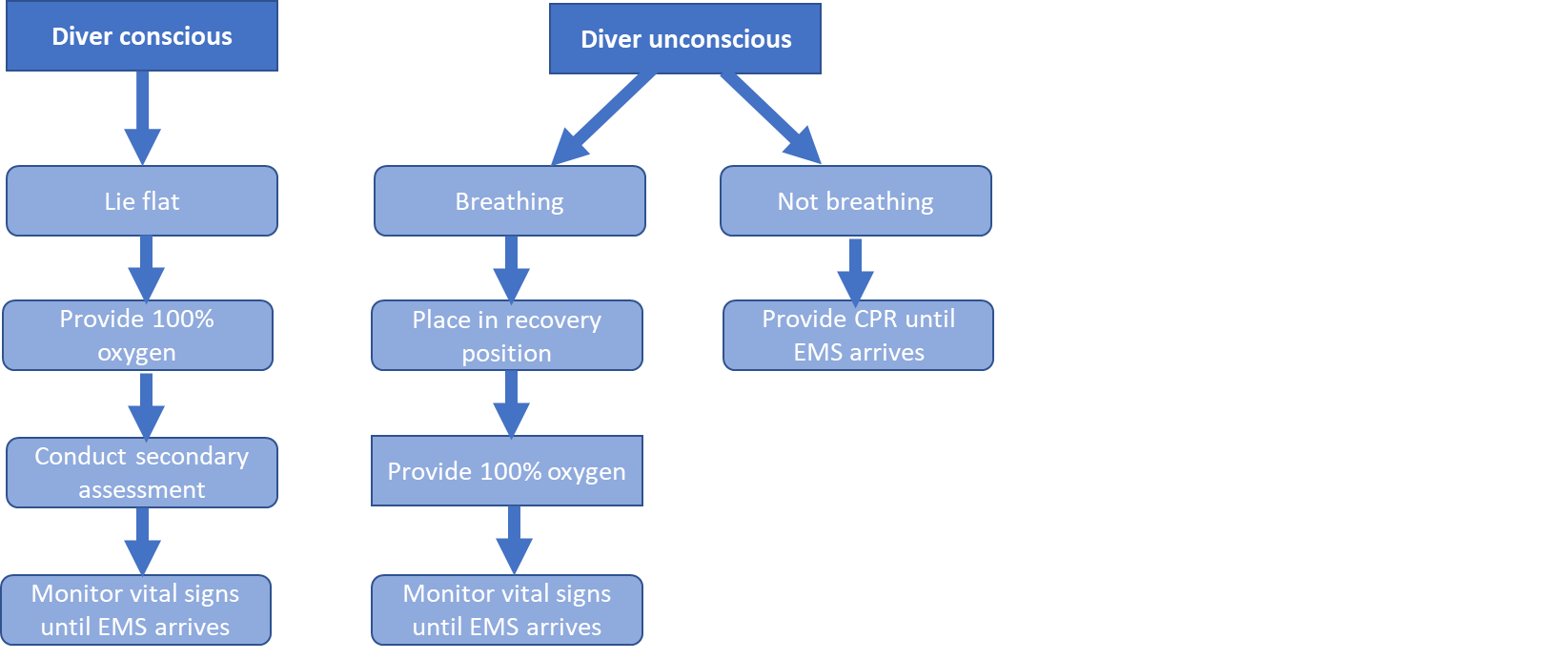
**General Procedures:**

In the event of any type of accident or emergency:

* Do not risk further injury to any other person under any circumstances.
* Contact Emergency Services as soon as possible for assistance.
* Do not panic, work as a team, communicate.

**Injured diver:**

1. Recover diver from water.
2. Provide essential First Aid: DRSABCD and emergency oxygen.
3. Call Emergency Services **000** or **VHF channel 16.**
4. Recall any divers still in the water using recall signal.
5. Ensure all other team members are present and not at risk.
6. If additional medical advice is required, call Divers Emergency Services (DES) **1800 088 200**
7. Collect essential information and complete Injury form.
8. Recover the injured diver’s equipment if possible, giving due regard to any dangers involved in doing so and the consequences of any delays such action may cause. Keep it apart from other equipment for expert examination if necessary.



**First Aid procedures (see flowchart):**

Always follow DRSABCD protocol.

If casualty is conscious

1. Lie diver flat.
2. Administer 100% oxygen.
3. Reassure and conduct secondary assessment.
4. Monitor vital signs.
5. A neurological exam may be performed to assist in determining DCI.
6. Contact DES 1800 088 200 and follow instructions.

If casualty is unconscious but breathing

1. Contact Emergency Services 000 or VHF 16
2. Put in recovery position.
3. Provide 100% oxygen.
4. Monitor vital signs until help arrives.

If casualty is unconscious and not breathing

1. Contact Emergency Services 000 or VHF 16
2. Provide CPR until help arrives.

**Evacuation to medical facility or hyperbaric chamber**:

1. Advise Emergency Services of your location, nature of injuries and assistance required.
2. Follow instructions of Emergency Services.
3. Prepare injured person for transfer.
4. Prepare incident report to accompany victim.
5. If on a boat, proceed to nearest rendezvous with EMS.
6. Patient should be accompanied by the Diving Coordinator or another diver. If this is not possible, record the destination of the casualty.

**Missing diver:**

1. Diver to search for 1 minute searching in a 360 degree circle.
2. If not reunited, swim to the surface omitting any safety stops. Decompression stops must be adhered to.
3. Diver to wait at surface for lost buddy for 4 minutes.
4. If still missing, contact emergency services immediately.
5. Recall any divers still in the water using a recall signal such as revving the motor three times or pulling on their dive flag.
6. Mark last know position of lost diver using GPS or with a marker buoy.
7. Delegate lookouts, if possible, who can look for diver or bubbles from surface.
8. If safe to do so, prepare a search team. This may be a surface search using snorkel pairs or and underwater search with a buddy pair. A search should only be conducted giving due consideration to sufficient gas availability, nitrogen commitments and environmental conditions.
9. Start search where diver last seen and search down current. An expanding circle search or U-shaped search may assist.

**Post-incident procedures:**

1. Notify Diving Officer and other emergency contacts.
2. Report incident/injury online through MyUNSW.
3. ‘Notifiable incidents’ must be immediately reported to SafeWork NSW. This includes the death of a person, a serious injury or illness or a dangerous incident.

**APPENDIX L: INCIDENT AND INJURY REPORT (boating and diving)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Details of incident (eg to a worker or visitor) and treatment** | | | | |
| Date of incident |  | | | |
| Time of incident | am  pm | | | |
| Nature of incident | Near miss  First aid  Medical treatment/doctor | | | |
| Name of injured person |  | | | |
| Address |  | | | |
| Occupation |  | | | |
| Date of birth |  | | | |
| Telephone |  | | | |
| Employer |  | | | |
| Activity in which the person was engaged at the time of injury |  | | | |
| Exact site location where injury occurred |  | | | |
| Nature of injury and symptoms – eg laceration, dizziness |  | | | |
| Body location of injury (indicate location of injury on the diagram) |  | | | |
| Treatment given on site |  | Name of treating person | |  |
| If diving please provide dive profile (depth, time in/out, previous dives) ,  and segregate equipment used. |  | | | |
| Referral for further  treatment?  Yes  No | Name of doctor or hospital | WorkCover medical  certificate received?  Yes  No | | Attach copies |
| **Witness to incident (each witness may need to provide an account of what happened)** | | | | |
| Witness name |  | Witness contact |  | |
| Witness name |  | Witness contact |  | |

|  |
| --- |
| **Details of incident (eg property, plant or environmental damage)** |
| Date of incident Time of incident  am  pm |
| Location of incident |
| Details of damage to  Equipment or property |
| Name of person who Telephone  Received the report |

|  |  |
| --- | --- |
| **Description of incident** | |
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|  | |
| **Immediate response actions (eg barricades, isolation of power) to stabilise the situation** | |
|  | |
|  | |
| **Reported to** | |
| Reported to UNSW diving or boating manager?  Yes  No | Provide details (when, reported to and reported by): |
| Reported to UNSW online reporting system?  Yes  No | Provide details (when, reported to and reported by): |
| Reported to authorities  (WorkCover phone: **13 10 50**)?  Yes  No | Provide details (when, reported to and reported by): |

|  |  |  |  |
| --- | --- | --- | --- |
| **Completed by** | | | |
| Name |  | Position |  |
| Signature |  | Date |  |

# 

# APPENDIX M: REGISTERED OCCUPATIONAL DIVING MEDICS IN METROPOLITAN SYDNEY

|  |  |  |
| --- | --- | --- |
| **NAME:** | **ADDRESS:** | **CONTACT:** |
| Dr Priti Bhatt | Suite 506  Level 5, 74 Pitt Street  Sydney | <http://www.samcen.com.au/bookings.html> |
| Dr Susan Willis | University Health Service  University of Sydney  Sydney | 02 9351 3484 |
| Dr Karen Oswald | 98 Balmoral St,  Hornsby  Sydney | 02 9476 3644 |

For a comprehensive list of Occupational Diving Medics go to the South Pacific Underwater Medicine Society (SPUMS) website: www.spums.org.au