

# MANAGEMENT OF SCIENTIFIC DIVING PROCEDURE

## SCOPE

This procedure relates to sanctioned scientific diving activities under the management and control of Monash University in Australia and applies to affected staff, students, contractors and visitors.

## PROCEDURE STATEMENT

This procedure specifies the actions that must be taken in order to effectively manage the hazards associated with scientific diving and snorkeling activities.

### 1. Abbreviations

<b>BCD</b>	Buoyance Control Device
<b>BT</b>	Bottom Time
<b>DCI</b>	Decompression Illness
<b>DRDC</b>	The Defense Research and Development Canada
<b>DMT</b>	Diver Medical Technician
<b>DSO</b>	Diving Safety Officer
<b>EAD</b>	Equivalent Air Depth
<b>EANx</b>	Enriched Air Nitrox
<b>EBT</b>	Effective Bottom Time
<b>MOD</b>	Maximum Operating Depth
<b>OH&amp;S</b>	Monash Occupational Health & Safety
<b>PDTA</b>	Professional Divers Training Academy
<b>PFD</b>	Personal Flotation Device
<b>S.A.R.A.H</b>	Safety And Risk Analysis Hub
<b>SCUBA</b>	Self-Contained Underwater Breathing Apparatus
<b>SI</b>	Surface Interval
<b>SSBA</b>	Surface Supplied Breathing Apparatus

### 2. Classification and Competency of Divers

The following section details the diver classifications recognised by Monash University to perform diving operations.

#### 2.1 Diving Safety Officer (DSO)

The Diving Safety Officer should keep up to date with current developments in diving technology and practices.

##### 2.1.1 The Diving Safety Officer must:

- Hold a current occupational diver classification as per AS/NZS 2299.2:2002. Hold a current AS/NZS 2299.1:2015 dive medical

- Hold current certification in first aid, including cardio-pulmonary resuscitation (CPR) and oxygen administration to diving casualties.
- Perform SCUBA rescue techniques and management of casualties.
- Be capable of acting as a dive coordinator
- Have at least 100h of underwater diving experience; and
- Pass swim test and check out dive.

## 2.2 Dive Coordinator

### 2.2.1 A Dive Coordinator must:

- Hold a current occupational diver classification as per AS/NZS 2299.2:2002.
- Hold a current AS/NZS 2299.1:2015 dive medical;
- Hold current certification in first aid, including cardio-pulmonary resuscitation (CPR) and oxygen administration to diving casualties.
- Hold an open water diver certification through a recognized certified scheme;
- Log at least 15 hours of Scientific diving;
- Be able to recognize and manage diving emergencies;
- Be appointed in writing by the DSO to supervise diving operations;
- Have experience in the diving techniques, which may be required and in the use of equipment and procedures used in any diving operation for which they will act as the Dive Coordinator;
- Show proof of having undertaken >50hrs open water dives, to include a minimum of:
  - 10 dives between 15m and 20m;
  - 12 dives in the last 12 months, including at least 6 with a scientific task of work; and
- Pass swim test and check out dive.

## 2.3 Scientific Diver

### 2.3.1 A Scientific Diver must:

- Hold a current occupational diver classification as per AS/NZS 2299.2:2002. Hold a current AS/NZS 2299.1:2015 dive medical;
- Hold current certification in first aid, including cardio-pulmonary resuscitation (CPR) and oxygen administration to diving casualties;
- Be familiar with SCUBA rescue techniques and management of casualties;
- Be proficient in the use and user maintenance of appropriate SCUBA diving equipment;
- Be proficient in recording diving techniques;
- Be capable of acting as a dive coordinator at the surface;
- Be proficient in sampling techniques appropriate to the scientific discipline being pursued;
- Show proof of having undertaken >50hrs open water dives, to include a minimum of:
  - 10 dives between 15m and 20m.
  - 12 dives in the last 12 months, including at least 6 with a scientific task of work; and
- Pass swim test and check out dive.

All evidence must be recorded in nationally acceptable logs, counter signed by suitably qualified persons. None of the above precludes the possible requirement for a practical or theoretical demonstration of any or all of the points shown.

## 2.4 Restricted Scientific Diver

### 2.4.1 A Restricted Scientific Diver must:

- Have an open water diver certificate from a certified SCUBA training organization; have a minimum of 10 logged dives since certification;
- Have a minimum of 15 hours logged dive time or hold a restricted occupational SCUBA diver certification;
- Have a current AS/NZS 2299.1: 2015 dive medical;
- Be approved by the DSO;
- Be at least 18 years of age;
- Only participate in low risk diving operations;
- Only dive when conditions are suitable for untethered SCUBA mode;
- Be limited to 18m maximum depth;
- Dive with a Scientific Diver;
- Not act as a standby diver or dive leader;
- Not use powered tools or lift bags;
- Pass the Monash University New Diver Evaluation Assessment; and

- Pass swim test and check out dive.

2.4.2 A restricted diver is limited to a single initial period of up to 12 months without further extensions. At the end of the first 12 months, a restricted diver either progresses to Scientific Diver or ceases diving in a research capacity.

2.4.3 All evidence must be recorded in industry accepted logs, countersigned by appropriately qualified persons. Evidence may include the requirement for a practical or theoretical demonstration of skills described in this section.

## 2.5 Visiting Scientific Diver

2.5.1 Visiting Scientific Divers will be permitted to dive under the auspices of Monash University provided that they:

- Dive in accordance with the Management of Scientific Diving Procedures;
- Be approved by the DSO;
- Be certified as medically fit to dive as per AS/NZS 2299.1:2015;
- Supply documentation demonstrating their relevant scientific diving experience as outlined in AS/NZS2299.2:2002;
- Pass swim test and check out dive;
- Pass the Monash University Diver Competency Assessment; and
- If the visiting Scientific Diver is from another university, that university's DSO must supply a letter of recommendation and supporting qualifications for the Visiting Scientific Diver.

## 2.6 Visiting Restricted Scientific Diver

2.6.1 Visiting Restricted Scientific Diver will be permitted to dive under the auspices of Monash University provided that they:

- Dive in accordance with the Management of Scientific Diving Procedures;
- Be approved by the DSO;
- Be certified as medically fit to dive as per AS/NZS 2299.1:2015;
- Pass swim test and check out dive;
- Pass the Monash University New Diver Evaluation Assessment;
- Supply documentation demonstrating their relevant scientific diving experience as outlined in AS/NZS2299.2:2002;
- If the visiting scientific diver is from another university, that university's DSO must supply a letter of recommendation and supporting qualifications for the visiting Restricted Scientific Diver; and
- All visitors who are Restricted Scientific Divers must comply with Section 3.4 Restricted Scientific Divers.

## 2.7 Volunteer Diver

A volunteer diver is someone who assists on a scientific dive but is not directly or indirectly affiliated with the research team. A volunteer diver does not hold a scientific diver or restricted scientific diver qualification. It is highly recommended that if a person is interested in assisting as a volunteer then the diver should obtain the Restricted Scientific Diver rating within 12 months of commencing as a volunteer.

2.7.1 Volunteer divers must:

- Have a minimum of an open water diver certificate from a recognized SCUBA training and certifying organization;
- Have a minimum of 10 logged dives since certification;
- Have a minimum of 15 hours logged dive time or hold a restricted occupational SCUBA diver certification;
- Have a current AS/NZS 2299.1 :2015 dive medical;
- Pass swim test and check out dive;
- Pass the Monash University New Diver Evaluation Assessment;
- Be at least 18 years of age;
- Be limited to 18m maximum depth;
- Dive and buddied with a Monash Scientific Diver at all times;
- Have an additional written risk assessment, solely related to the volunteer and the duties they are to perform, to any duties being undertaken by a volunteer;
- Competency to perform the task is determined by the experience and training of the diver, counterchecked and documented by the DSO;
- Cannot perform a task that is beyond their level of competency;
- Not use powered tools or lift bags; and
- Only dive when conditions are suitable.

## 2.8 Undergraduate Diver

This allows students to dive as part of their university studies on sanctioned undergraduate course field trips only.

**Note:** Meeting the minimum requirement does not guarantee scuba diving as an option on field trips and is a subject to a risk assessment carried out by the diving safety officer. Other factors such as the availability of suitable buddy pairings, environmental conditions, supervisory personnel etc. determines if scuba diving can take place. Students must have a minimum of:

- An open water certification from a nationally recognized training agency;
- A current dive medical certified in accordance with AS2299.1:2015;
- 15 hours of logged countersigned diving experience;
- Pass swim test and check out dive;
- Pass the Monash University New Diver Evaluation Assessment; and
- The dives must be low risk, controlled and well supervised.

## 2.9 Divers Attendant

Divers attendants must have a minimum of a current First Aid and oxygen administration certificate.

# 3. Supervision of Health

## 3.1 Fitness To Dive

- 3.1.1 All divers must ensure that they are fit to dive. Fitness should be maintained by exercise and regular diving. Any noticeable variation in normal feeling of health and fitness should be immediately reported to the dive leader and to a medical practitioner if the variation persists. Divers must not dive if they feel unwell or do not believe that their level of fitness or mental preparedness has deviated from their normal wellbeing.
- 3.1.2 If a member of the dive team feels that for any other reason diving would be unsafe, then that person must convey their concerns to the Dive coordinator.
- 3.1.3 Members of a dive team must not be pressured or coerced into diving if they choose, for any reason, not to dive.
- 3.1.4 If 6 months has lapsed from the last time a dive was performed, the diver must conduct a check out dive or program of dives with the Diving Officer or Dive Officer's delegate to ensure the diver is eligible to dive. The evaluation of the dive conditions and divers experience should be considered throughout the evaluation.

## 3.2 Intoxicants/ Illicit Drugs

- 3.2.1 Diving must not be undertaken while the diver is under the influence of any intoxicants. Diving cannot be undertaken within 8 hours of consuming any alcohol or if the diver is under the influence of any drugs that may impair his or her mental or physical capacities.

# 4. Medical Requirements

## 4.1 Medical Evaluation

- 4.1.1 All Monash University staff, students and volunteers intending to dive as part of their work or study must have a formal medical evaluation, performed by a doctor trained in underwater medicine, and carried out in accordance with the criteria set out in Australian Standard AS/NZ 2299.1:2015

## 4.2 Frequency of Medical Evaluations

- 4.2.1 Medical evaluations must be completed:
  - a) Annually unless it has been revoked, superseded or has a time or some other limitation imposed upon the certificate to preclude the holder from participating in the proposed diving operation. The results of any subsequent examination should be forwarded to the DSO;
  - b) After any major injury or illness, or any condition requiring hospitalisation for more than 24 hours, or after any diving accident requiring treatment in a hyperbaric chamber. If the injury or illness is pressure related, then the clearance to return to diving must come from a physician trained in diving medicine; and

- c) At an earlier time if required by the underwater medicine medical practitioner.

#### 4.3 Records of Medical Examinations

Records must be maintained by the medical practitioner and a certificate issued to the diver of their current diving medical status. A certified copy of the certificate must be provided to the University DSO.

## 5. Other Medical Considerations

### 5.1 Prescription Medications

Some drugs / medications may compromise diver safety by impairing judgment and/or concentration. Divers must ensure that any medication they are taking will not compromise their safety while diving. Particular attention should be paid to medications used to prevent seasickness and to assist people to stop smoking.

Individuals under medical orders are unlikely to be diving, but the common practice of “self-medication” may present a hazard, particularly in three situations: headaches, upper respiratory tract problems (e.g. Hay fever), and seasickness.

- **Headaches:** Pain relieving drugs of all types should be avoided during diving. If pain is sufficiently severe to require drugs then the diver is not fit to dive.
- **Upper Respiratory tract problems:** Routine self-medication with nasal drops to facilitate ear cleaning may be medically hazardous. Such routine use should only be undertaken under medical supervision. The presence of any form of upper respiratory tract infection (common cold, sinusitis, middle ear infection, tonsillitis, sore throat...) imposes an absolute ban on diving until the infection has cleared.
- **Seasickness:** Any diver suffering from seasickness must report the illness to the Dive Coordinator. It is at the discretion of the Dive Coordinator if the diver suffering from seasickness will conduct any subsequent dives or need to wait until recovery.

## 6. Minimum Dive Personnel Requirements

At every dive there must be sufficient personnel to carry out the dive safely. In addition, sufficient first aid personnel with first aid and oxygen administration training must be present.

Monash University prohibits solo diving.

### 6.1 Free-swimming Mode Scuba Diving Operations in Open Water

6.1.1 The following personnel must be present:

- One Dive Coordinator;
- Two buddy divers; and
- One diver's attendant.

6.1.2 The dive Coordinator may act as the diver's attendant, dive leader or as a diver. Thus the minimum dive team number is three, one of whom will remain at the surface dive coordinating position.

6.1.3 If the Dive Coordinator enters the water the duties may be transferred to another person with equal or higher Dive Coordinator qualifications.

6.1.4 Free swimming dive buddies must maintain effective two-way communication at all times to be able to render assistance if needed.

### 6.2 Scuba Diving Operations In An Aquarium, Pools Or Sheltered Open Water

6.2.1 The following personnel must be present:

- One Dive Coordinator;
- One buddy diver; and
- One diver's attendant.

6.2.2 The DSO may allow a dive team of two in exceptional circumstances, where minimal risk is present.

6.2.3 The dive coordinator must maintain a constant vigil with the diver and must adorn all diving equipment and be ready to enter the water provide assistance if required. They must not enter the water unless rendering assistance.

6.2.4 In sheltered open water, the single diver must be tethered.

6.2.5 Restrictions:

Authorisations of a dive team member of two must not be considered if any of the following apply:



- Poor visibility;
- Danger to the diver by currents in the vicinity of the workplace;
- Risk of entrapment or entanglement of his/her equipment;
- A situation in where a third party assistance is not readily available in an emergency; and
- If the dive is from a boat and the boat cannot be securely anchored or moored.

### 6.3 Tethered Mode Scuba Diving Operations for Dive Depths of Up To 21m

6.3.1 The following personnel must be present:

- One Dive Coordinator;
- One diver;
- One divers attendant; and
- One standby diver.

6.3.2 The Dive Coordinator may act as either the diver's attendant or the standby diver, thus the minimum dive team number is three, one of whom will remain at the surface dive coordinating position

6.3.3 The diver shall be either:

- a) Secured by a lifeline which is tended by the diver's attendant; or
- b) Secured by a float whose surface float is observed by the divers attendant at all times.

6.3.4 Communication between the diver's attendant and the SCUBA diver must be maintained at all times.

6.3.5 When a diver is tethered to a float line the divers attendant must maintain the ability to recall the diver by means of an agreed signal at all times.

### 6.4 Tethered Mode Scuba Diving Operations Exceeding 21m

6.4.1 The following personnel must be present:

- One Dive Coordinator;
- One diver;
- One divers attendant;
- One standby diver; and
- One standby diver's attendant.

6.4.2 The dive coordinator may act as the diver's attendant or the stand by diver's attendant or carry out other surface duties but must not be the attendant for both the standby diver and the diver, thus a minimum of four people, two of whom must remain at the surface.

6.4.3 The SCUBA diver tethered by a lifeline must maintain the ability to communicate with the divers attendant at all times. If only one diver is in the water voice communication between the diver and the dive coordinator is recommended.

## 7. Monash University New Diver Evaluation Assessments

New divers registering with the DSO or who have not participated in a dive in the previous 6 months must read and comply with the New Diver Evaluation Assessment.

### 7.1 Dive Register

All persons conducting diving, snorkelling, and/or boating activities must:

- Register on the Dive Register;
- Attend an introductory session with the DSO; and
- Participate in a New Diver Evaluation Assessment if they have not participated in a dive in the past 6 months. The DSO or delegate may then impose restrictions on a diver's activities on the basis of his/her logged experience.

## 8. Diving Reciprocity with other Universities/Organisations

- Where Monash University divers are operating with divers from another scientific organisation or are working under the auspices of the other organisation then Monash University diver/s are bound by that organisation's diving code. In this situation

they must meet all certification requirements of that organisation, and gain approval to dive from the organisation's Diving Safety Officer (as required by their diving regulations).

- Monash University's DSO must be satisfied that the hosting organisation's diving code is equal to that or exceeds this procedure. Where it does not, the DSO must provide written confirmation to the diver and the organisation of the additional requirements the Monash University diver must adhere to.
- The diver must log any dives conducted into the Dive Log Register as dives may impact their surface intervals, flying after diving and future diving.
- Where Monash University personnel are working with divers from another organisation, but from a Monash University vessel, or on any official Monash University diving operation, then the divers from the other organisation(s) must be registered in the Dive Log Register, meet all minimum requirements of the University, and gain approval to dive from the DSO. All Monash University procedures and forms must be completed in this situation and approval of such activities granted by the DSO.
- It is at the discretion of the DSO to approve any divers with qualifications from an agency that has no established reciprocity with Monash University.

## 9. Equipment

- Diving equipment must comply with the relevant requirements outlined in section 4, "Diving Equipment" of AS/NZS 2299.2.
- Prior to entering the water it is the responsibility of individual divers to check that the equipment they are using is in good working order. The divers buddy must also check the equipment is correctly set up prior to use and check it is in good working order.

### 9.1 Minimum Equipment Requirements

#### 9.1.1 SCUBA divers

For SCUBA diving operations, the underwater equipment must include:

1. Open-circuit SCUBA with two demand regulators;
2. Face mask;
3. Swimming fins;
4. Snorkel for surface swimming;
5. Diver's knife or tool;
6. Weight belt with a quick-release closure;
7. Submersible pressure gauge for measuring breathing gas pressure in cylinder;
8. Wetsuit or protective clothing appropriate for the conditions of work and the temperature of the water;
9. Buoyancy compensator of an approved design that is inflatable orally and from a compressed air cylinder;
10. A dive computer to measure time elapsed and a diver's depth gauge with a maximum depth indicator; and
11. A high visibility signalling device such as a safety sausage.

### 9.2 Personal SCUBA Equipment

Personal cylinders, regulators and air gauges may only be used if they comply with all requirements as outlined in section 10.3. Personal equipment must be included on the Monash University Diving Equipment Register. Maintenance records for personal SCUBA equipment must be forwarded to the DSO.

### 9.3 Maintenance of Equipment and Servicing Requirements

All equipment used for diving must be well maintained and in good working order. Records of maintenance must be retained by the DSO. Additional specific requirements are as follows:

**Table 1. Equipment maintenance, testing requirements**

Equipment type	Minimum testing requirement	Tester requirement	DSO notification required	AS/NZS Standard
Air cylinders	Annual (every 12 months), including hydrostatic inspection	Approved service facility	Yes	AS/NZS 2030 AS/NZS 2299
Regulators	Annual (every 12 months)	Approved service facility	Yes	AS/NZS 2299
Pressure/Depth gauges	6 months	Approved service facility	Yes	AS/NZS 2299

#### 9.3.1 Faulty equipment

All faulty equipment must be put aside and tagged out with the details of the problem and the owners of the equipment notified.

## 9.4 In-Field Equipment Service

Staff and postgraduate students wishing to service/repair dive gear in the field must be trained and certified to perform services to the manufacturer's specification for dive equipment and tanks. Therefore, the person must be a certified Service Technician for the brand of equipment being serviced. There is no generic service technician qualification.

## 9.5 Communications

When diving in circumstances in which there is surface support, there must be a means to recall the divers to the surface immediately.

Through water voice communications should be considered.

The Dive Coordinator must ensure that at or close to every dive site there are adequate means of immediate communication with the appropriate land emergency services (e.g. rescue or medical) in the event of an emergency.

## 9.6 Marine Wildlife Aversions Equipment

If the diving operation is to be undertaken in an area where aggressive sharks are known to occur, or if tasks undertaken on the dive could attract sharks (e.g., adding burley to water to catch fish) then extra precautions must be taken. If the risk assessment determines that the use of electronic shark repellents (commonly known as 'shark shields') is required as a hazard control measure, then the Dive coordinator must require their use by each diver.

## 9.7 Pneumatic Tools

Scientific Divers or Visiting Scientific Divers may use hand-held pneumatic tools if they are competent to do so. The air supply for the pneumatic tool must be carried by the diver and must be taken from a source entirely separate from the diver's breathing gas supply. The use of surface supplied air for pneumatic tools is not allowed.

Restricted Scientific Divers and Volunteer Divers are not permitted to use pneumatic tools of any form.

## 9.8 Safety Equipment

### 9.8.1 First Aid Supplies

For every dive operation there must be a first aid kit available (Appendix E). There should be at least 2 litres of vinegar and some cold packs for the treatment of jellyfish stings. Supplies for treatment of bites and stings from other marine wildlife should be available.

### 9.8.2 Oxygen Administration Equipment

Provision of as close as practicable to 100% oxygen via a facemask is recognised as the main first aid procedure for treating diving injuries such as decompression illness, embolisms and shock. The University provides DAN oxygen kits to fulfil this requirement. The kits are to be used by trained operators or under the guidance of suitable qualified diving personnel.

Breathing oxygen should not be seen as a final step in first aid treatment. Improvement in the patient's condition while being treated on oxygen does not negate the need for proper medical assessment by a doctor trained in diving medicine.

It is the responsibility of the Dive coordinator to ensure that the dive operation has sufficient oxygen for treatment of a patient until professional medical treatment can be administered. The Australian Resuscitation Council recommends a minimum oxygen supply of 1500 litres.

## 9.9 Additional Equipment

9.9.1 The following equipment may be used provided diver safety is not compromised:

- Underwater slates, measuring tapes, lightweight grids, frames and traps;
- Sledge hammer or hammer to pound in stakes and pickets;
- Small hand tools such as screw drivers, pliers, wrenches, etc;
- Hand held pneumatic tools (Note A);
- A small lift bag (Note B);
- Spear guns used under a permit approved by DSO or delegate; and
- Shark Shields (as deemed necessary by the Dive coordinator or diver).

**Note A.** The use of hand held pneumatic tools must be approved by the DSO. All divers must have sufficient training with pneumatic tools. Air for these tools must be taken from a source entirely separate from the diver's air supply. Pneumatic equipment used underwater must be specifically approved for this purpose. Pneumatic tools and equipment must be de-energised before being placed into or retrieved from the water.



**Note B.** The use of lift bags must be approved by the DSO. All divers must have sufficient training with lift bags. Air for filling the bag must be delivered from a source that is not the diver's primary regulator, such as an octopus regulator.

#### 9.10 University Controlled Compressor Systems

Users who have not previously used the University's compressors must be given detailed operational and safety inductions, by the staff member responsible for that compressor, before being allowed to fill tanks. A training register of authorised users must be maintained. SWI for filling SCUBA must be posted/made available for compressor areas.

#### 9.11 Diving at Altitude

When diving is to be conducted at altitude, the dive plan you follow to maintain proper decompression limits must be adjusted based on your altitude in order to maintain your safety

Most gauges are set up primarily for use at sea level and therefore may need to be calibrated.

Due to the lower atmospheric pressure a diver planning repetitive dives at altitude must wait more than six hours after arriving before descending to depth.

## 10. Pre-Dive Operation Planning

The Appendix B of AS/NZS 2299.2 -*Diving Operations Manual*, should be consulted in conjunction with this section.

#### 10.1 Dive Site Registration and Risk Assessment

New dive programs and dive sites are required to be registered with the DSO. During field activities, the dive coordinator may register new dive sites.

Registration must include the following:

1. Risk assessment of the site and the proposed work;
2. Emergency protocols and numbers;
3. Emergency response plans;
4. Exposure, isolation, known or anticipated depth and tidal currents;
5. Other hazards as appropriate; and
6. Travel aspects including altitude exposure.

##### 10.1.1 Application for Diving and Boating Project

Before the commencement of a Diving Activity, the following documents must be submitted to the DSO and Head of Academic Unit or delegate:

- Monash University Dive Plan/ Approval form;
- The Dive site registration form;
- Completed Risk Assessment for Monash University Dive Operations, including Emergency response Plan which must include information on emergency contact procedures, number and length of trips per year (if applicable), proposed areas of operation for the project and confirmation signatures from the supervisor and Head of School and must be attached directly to every Dive Plan for that project;
- Monash University Induction and Medical Form for Volunteers ( if relevant);
- The Monash University statement of understanding document; and
- The Monash University SCUBA or SNORKEL Diver registration form.

##### 10.1.2 Project Protocol

For every Dive and Boat Project Application a Project Protocol must be attached. The protocol must contain as much information as possible, including an outline of methodology, animals/specimens and materials involved in the project (if relevant), maps of proposed study sites, distance from shore, required boats, etc. An updated protocol must be attached to subsequent applications when necessary. The project proposal is to include an emergency response plan as outlined in section 14.1 of this procedure.

#### 10.2 Dive Plan

Dives should be planned around the competency of the least experienced diver. Before conducting any diving operations under the auspices of Monash University, the Dive Supervisor/ Principal Researcher for a proposed operation must formulate and submit a dive plan (Form 5), which must include the following in accordance with AS/NZS 2299.2:

- Location of the dive;
- Consideration of surface and underwater conditions and hazards;
- Maximum depth at bottom of dive and estimated dive times;
- Thermal protection required;
- The tasks of all members of the diving team;
- Residual inert gas status of dive team members;
- Decompressions schedules.

If required:

- Breathing gas supply, appropriate for the dive; emergency procedures to be followed in the event of equipment/system malfunction or an accident;
- Divers' names, medical dates, duties and last dive details;
- Approximate number of proposed dives; and
- Proposed equipment, and boats to be employed.

An Emergency Response Plan, Risk and Hazard Assessment should have been completed for the dive location and attached to the Application for Diving and Boating project. If this has not been done the forms must be attached to the Monash University Dive Plan/ Approval form and Trip Operational Details for approval.

**Important:** The Dive Supervisor/ Principal Researcher must ensure that the Dive Plan and attached forms have been signed by the DSO or delegate at least 1 week before undertaking any diving operation.

### 10.3 Decompression Tables and Dive Computers

Dive computers and tables are just guides to the physiological process of breathing compressed gases at depths. They do not take into account variations in age, sex, weight, physical conditioning, recent illnesses or injuries etc., of individuals.

- Decompression Tables.** The DCIEM Air Diving Tables must be used for all diving since they are generally more conservative for repetitive and multi day diving than other dive tables.
- Dive Computers.** Divers may use dive computers to keep track of or assist with the dive, not to plan or control the dive. DCIEM tables are to be used for both planning and control of the dive. Monash University dive computers must be checked out through the DSO. A Dive Computer User Agreement must be filled out and the diver must understand how to operate the dive computer.

The dive tables and computers are to be used even more conservatively if the diver is subject to conditions which increase the possibility of decompression illness, such as: dehydration, alcohol consumption, and strenuous exercise before, during or immediately after a dive, age, excessive fat tissue, injury, tiredness etc.

### 10.4 Boat/ Shore Dive Requisition Plan

A plan of proposed area of work must include information on; digital maps of study site/location, distance from shore, Boat Requisition Form (if used), required equipment and qualifications of participants. A minimum of a Restricted Coxswains, Marine Radio Operators Ticket, and Senior First Aid with CPR are required for any boat operator.

#### 10.4.1 Off-Campus Activities and Travel Procedure

Details of the risk assessment information in SARAH and safety briefing is to be provided to participants as per the [Off-Campus Activities and Travel Procedure](#). Participants details, dive qualifications and signed OHS induction attendance are submitted with the Dive Plan to the Diving Safety Officer (DSO) and Head of School at least seven working days before departure of the field trip. A Dive Trip Checklist must be used to account that all procedures are followed before, during and after a dive operation. The checklist must include; the briefing, field dive log, and debriefing notes.

#### 10.4.2 Volunteers on Field Trips Form

Details of the risk assessment information and safety briefing is to be provided to participants . All persons participating on the field trip are informed of the remoteness, nature and hazards. It is also important that they acknowledge this and their responsibilities and obligations. To this extent the Dive coordinator of the trip must conduct an OHS induction detailing the field trip and have the participants read and sign the a OHS induction and the Off Campus [Volunteer](#) information sheet

## 10.5 Pre-Dive Safety Checks

### 10.5.1 Dive Briefing

It is important for a successful diving operation that each member of the dive team understands the objectives of the dive, that they understand their role and the other members of the dive team's roles in the dive. A dive briefing conducted by the Dive coordinator allows for the exchange of this information. It also allows the Dive coordinator to slightly modify the dive plan due to environmental conditions or the physical condition of any members of the dive team. The dive briefing should include but not be limited to:

- The objectives of the operation;
- Conditions in the operating area;
- Assignments of each member of the dive team;
- Review of communications (including any special hand signals, use of slates etc.);
- Any special equipment or considerations;
- A review of the Risk and Hazard Identification form noting any changes;
- Lost contact procedures, e.g., search for 1 min underwater if no contact, surface to continue search and reunite;
- Conditions controlling the termination of the dive (time, remaining air supply, etc);
- Review emergency response plan and recall procedures; and
- Soliciting questions to ensure understanding of task and assignments.

### 10.5.2 Equipment Evaluations

Each diver must ensure that his/her equipment is in proper working order and that the equipment is suitable for the type of diving operation. Each diver must also know the safe operation, capabilities and limitations of any equipment they use.

### 10.5.3 Pre-Dive Equipment Check

For all dives an adequate pre-dive check must be performed on both the diver's and stand-by diver's equipment. The pre-dive checks should include but are not limited to:

- Uninterrupted air flow from tank;
- Zeroing of contents gauge before turning on air supply;
- Air supply turned on;
- Contents of tank;
- Leaking hoses and or gauges;
- The operation of the contents gauge;
- The operation of second stages, second stage free-flow, torn mouth piece, etc.;
- Depth gauge reads zero and maximum depth indicator is zeroed;
- Inflator hose is connected, inflator operation is OK, dump valve operation is OK; and
- Security of tank in BCD harness, etc.

### 10.5.4 Site Evaluation

The environmental and other conditions: e.g., Weather, visibility, tide, currents, temperature, presence of any other craft etc. should be evaluated on site by the entire dive team.

## 11. Diving Procedures

The following activities are NOT permitted, except in exceptional circumstances, with explicit written permission from the Diving Safety Officer (DSO) and a risk assessment in S.A.R.A.H:

- Diving to depths greater than 30 meters;
- Diving with gas mixtures other than air (including in water decompression using oxygen);
- Diving with closed circuit or semi-closed circuit rebreather equipment;
- Diving with the use of Nitrox, Trimix, Heliox and Surface Supplied Breathing Apparatus (SSBA); and
- Surface supplied breathing apparatus (SSBA) to 30m as part of underwater construction activities including salvage activities.

### 11.1 Normal Dive Procedures

Normal dive procedures may contain but are not limited to; when the vessel is on site:

- Dive flag displayed;
- Equipment and environment checks;
- Control devices deployed (float or shot line etc.);
- Dive briefing;

- Surface interval, repetitive factor and time in recorded, maximum bottom time established for the dive plus any contingency times for variations in the dive profile;
- Safe entry and checks with buddy;
- Check that the anchor is secure;
- Compare depth gauge readings with other members of the dive team. Any discrepancies must be checked against an accurately measured depth of water;
- Start in-water operation;
- Dive attendant is on constant lookout where the divers are operating and for any external influences on the dive operation;
- Divers attempt to achieve objectives;
- Dive ends, slow ascent (< 9 m/min), Safety stop/s if required;
- Time out, bottom time and maximum depth recorded on a Dive record Sheet;
- Debrief dive;
- Record any problems, divers showing any signs of discomfort after diving must be assessed and treated accordingly. Form 20 may assist with assessment, when in doubt seek outside assistance; and
- Turn in Dive Checklist, Dive record sheet, and login to Dive Log Register and update dives for the day/week or within 7 days from completion of the dive trip.

#### 11.1.1 Refusal to Dive

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

#### 11.1.2 Termination of the Dive

- a) It is the responsibility of the diver to terminate the dive, without fear of reprisal, whenever he/she feels it is unsafe to continue the dive, unless it compromises the safety of another diver already in the water.
- b) The dive must be terminated while there is still sufficient cylinder pressure to permit the diver to safely reach the surface, including safety stop time with a reserve of 20- 30 bar of air remaining.

#### 11.1.3 Emergencies and Deviations from Regulations

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

## 11.2 Post-Dive Procedures

### 11.2.1 Post-Dive Safety Checks

After the completion of a dive, each diver must report any physical problems, symptoms of decompression illness, or equipment malfunctions. Divers showing and signs of discomfort after diving must be assessed and treated accordingly. The Monash Diving Emergency Protocols and Field Neurological Assessment test may assist with assessment, when in doubt seek outside assistance.

### 11.2.2 Flying or Ascending to Altitude after Diving

To minimise the risk of developing Decompression Illness whilst travelling after diving, a diver should have a minimum surface interval of 24 hours before ascending to altitude or flying.

## 11.3 Shore Diving

In addition to normal dive procedures the following procedures must be followed for diving from the shore:

- A shore party including a diver's attendant must have a communication link to emergency services and monitor divers and their floats at all times;
- Dive sites must be identified with a secured floating device with dive flags attached or at least one of the diving team must be secured to a float line with dive flag attached.
- Access to oxygen resuscitation equipment within 5 minutes of point of entry; and
- When shore diving is being conducted in an environment of strong currents, strong surge and limited visibility, a rescue tender must be on standby;
- Diving restricted to 50 metres from the shore. Greater distances are subject to DSO approval and will require a dive flag; and
- The dive must be terminated in accordance with AS/NZS 2299.2:2015 or the pre-dive plan.

## 11.4 Night Diving

Refer to table 2 and section 14 of this procedure for night dive requirements.

## 11.5 Ascent Rates And Stops And Gas Supplies

### 11.5.1 Safety stops

It is highly recommended that wherever possible, the following planned ascending safety stops be completed at the end of any dive:

- For no-decompression dives less than 20m depth, a stop at 5 metres for 3 minutes; and
- For no-decompression dives between 20m and 30 m depth, a stop at 5 metres for 5 minutes.

The performance of safety stops by divers, even after short dives to shallow depths, has been proven to reduce the incidence of decompression illness.

### 11.5.2 Ascent rates

It is highly recommended that wherever possible all divers adopt an ascent rate of not more than 9 metres per minute. Reduction in ascent rate to this speed has been shown to be beneficial in reducing the incidence of decompression illness in divers.

### 11.5.3 Breathing gas supplies

Every SCUBA diver must carry a sufficient quantity of breathing gas to complete the planned dive plus a reserve supply providing a minimum safety margin 50 bar for all dives.

### 11.5.4 Remaining cylinder pressure

Dives must be terminated when either diver in a buddy pair reaches a cylinder pressure of 30 bar. Safety stops must still be performed if safe and practical. Any diver returning with less than 30 bar will be required to pay for the tank to be tested. Divers constantly returning with less than 30 bar or running out of air during a dive may lead to the diver being banned from any further diving.

## 12. Risk Management

A Project OHS Risk Assessment and a Dive Site Risk Assessment must be carried out for all Monash University diving operations in accordance with [OHS Risk Management Procedure](#). The DSO and Dive Coordinator must give special consideration to dives involving any high risk factors. Table 2 details potential diving hazards, their risks and control actions.

The Project Supervisor and DSO must ensure that suitable measures to are put in place to control any risks that have been identified

Once on site, it is the responsibility of the Dive Coordinator for each operation to implement safe control actions identified and conduct day to day risk assessments

Risk assessments should be reviewed as divers gain more experience in the designated sites.

**Table 2: Potential Hazards and Risks**

Risk factor	Hazard type	Control measures
Blue water diving	Pressure, communication	<ul style="list-style-type: none"><li>• Consult with SDO before considering a project involving this activity. Specialized equipment for assessment of water depth and additional safety protocols are required.</li></ul>
Cold temperatures	Thermal	<ul style="list-style-type: none"><li>• Suitable thickness wet suit, gloves, hood.</li><li>• Cease diving if too cold</li><li>• Keep warm prior to dive</li><li>• Reduce dive time</li><li>• Increase length of time between dives</li><li>• Dive coordinator to monitor divers health status</li></ul>



<b>Currents</b>	Physical	<ul style="list-style-type: none"> <li>• Tethering to a float or boat</li> <li>• Ensure experience boat operator to observe currents and weather patterns</li> <li>• Use a current line of &gt;50m length with a 10mm diameter streaming behind the vessel with diving flags (Divers to work up current of the vessel)</li> </ul>
<b>Dangerous marine animals</b>	Biological	<ul style="list-style-type: none"> <li>• Ensure indication in dive plans</li> <li>• Must brief DSO and persons in dive team of first aid procedures for animal related injuries</li> <li>• Dives or free dives within 1km of seal colonies must be informed to the DSO</li> <li>• Use of fabricated cages if required</li> <li>• Shark repellants (shark pods)/guards</li> <li>• Vinegar for stings</li> </ul>
<b>Decompression diving</b>	Physical - Pressure	<ul style="list-style-type: none"> <li>• Not permitted at Monash University unless approved by the DSO. These dives must comply with AS/NZS 2299</li> </ul>
<b>Deep dives</b>	Physical - Pressure	<ul style="list-style-type: none"> <li>• Permission required from DSO if exceeding 18m</li> <li>• Dives to depths of &gt; 39m on air are prohibited unless conducted in accordance with AS/NZS 2299.1 &amp; written permission by DSO</li> </ul>
<b>Dive profiles</b>	Physical - exertion, gas release in blood.	<ul style="list-style-type: none"> <li>• A dive profile which attains maximum depth early in the dive and gradually ascends to shallower depths is recommended</li> <li>• Dives that incorporate "rectangular", "reverse" or "saw tooth" profiles are known to expose divers to a higher risks of decompression sickness and should be avoided</li> </ul>
<b>Exercise</b>		<ul style="list-style-type: none"> <li>• Avoid physical exertion prior to a dive (DCI related to this)</li> <li>• Notify DSO/Dive Coordinator if physical exertion will be necessary before, during or after the dive to ensure dive times are calculated correctly</li> </ul>
<b>Fatigue contributing to DCI</b>	Physical - Pressure	<ul style="list-style-type: none"> <li>• Divers should not dive with fatigue</li> <li>• Dive Coordinator to monitor fatigue</li> </ul>
<b>High risk shallow dives</b>		<ul style="list-style-type: none"> <li>• Ensure dive flag erected in heavy traffic areas immediately above work site</li> <li>• Dive coordinator to minimise dive times to reduce occurrence of DCI</li> <li>• Calculate dive times required is diving in shallow water for extended times and present to Dive Coordinator/DSO</li> </ul>
<b>Ice and polar diving</b>		<ul style="list-style-type: none"> <li>• Consult with DSO prior to dives</li> <li>• The Australian Antarctic Division guidelines must be followed or those of the organisation through which the project is being conducted as agreed by the DSO</li> </ul>
<b>Inexperienced divers</b>		<ul style="list-style-type: none"> <li>• Not permitted to dive unless authorised by the DSO</li> <li>• Must not do any tusk underwater other than observe</li> <li>• Must be paired with a diver with a minimum of 50h experience</li> </ul>
<b>Live boating</b>		<ul style="list-style-type: none"> <li>• Ensure divers avoid propeller</li> <li>• Guard propeller</li> <li>• Not permitted at Monash University unless authorised by DSO</li> <li>• All diver must agree to the practice being conducted</li> </ul>

<b>Long dive times inducing DCI/multi day repetitive dives</b>		<ul style="list-style-type: none"> <li>• Reduce dive times</li> <li>• Ensure dive plans are viewed by DSO</li> <li>• Divers must not spend more than 6hr total time in the water in any 24 hour period, whether the tables allow this or not.</li> <li>• Divers performing successive multi-day repetitive dives must use the DCIEM dive tables for calculating their no decompression limits on each dive.</li> <li>• Divers performing repetitive dives over multiple days must have a 24 hr break from diving <u>after every third day</u>, except where using repetitive dive profiles involving <u>less than</u> three dives per day, in which case a 24 hr break must be taken on the fifth day.</li> </ul>
<b>Multiple ascents increased risk of DCI</b>		<ul style="list-style-type: none"> <li>• Ascents shallower than 30m must be at a rate of slower than 9m/min.</li> </ul>
<b>Night diving</b>		<ul style="list-style-type: none"> <li>• Not recommended. Approval by DSO required.</li> <li>• Dive attendant must have a white signaling light</li> <li>• Boat must have a working anchor light</li> <li>• Flashing strobe must be attached to the anchor line below the surface visible to divers.</li> <li>• Exit lights must be erected when exiting from shore</li> <li>• Each diver must have a minimum of 1 torch (preferably 2) and a cyalume stick or light, which is visible in a 360<sup>o</sup> arc;</li> <li>• Dives exceeding 18m must be approved by the DSO</li> <li>• Only divers with appropriate training may night dive, that is, divers with either recreational advanced, commercial qualifications or an approved scientific diver course. Open water divers are not permitted to undertake night dives;</li> <li>• Divers with less than 5 logged night dives should be teamed up with more experienced night divers.</li> <li>• Working live or drift diving must not be carried out at night;</li> <li>• Night diving should only be conducted in low risk conditions.</li> </ul>
<b>Remote dive sites</b>		<ul style="list-style-type: none"> <li>• Any boat operating in remote areas must be equipped with extra fuel and all required radio, safety and first aid equipment, as well as any other items deemed necessary by the DSO or the Dive Coordinator for the trip.</li> <li>• For long field trips to remote areas, the Dive Coordinator for the operation must consider availability of the nearest recompression chamber in the event of a diving accident</li> </ul>
<b>Strong winds</b>		<ul style="list-style-type: none"> <li>• Only dive in sheltered areas</li> <li>• Dive Coordinator to constantly assess weather conditions</li> </ul>
<b>Use of plant and equipment</b>		<ul style="list-style-type: none"> <li>• Users must be trained in the use of plant and equipment.</li> <li>• Divers must comply with AS/NZS 2815.2 and use voice communications between surface operators and divers.</li> </ul>

## 13. Emergency Procedures

### 13.1 Emergency Response Plan

In the event of an emergency it is essential to immediately assist the injured person. To assist with this the Dive coordinator/Principal Researcher should ensure that an Emergency Response Plan exists and is up to date for their area of operation.

### 13.2 Incident Reporting Procedure

Report all incidents on an online Hazard and Incident report found in [S.A.R.A.H](#)

13.2.1 A summary of events leading up to the incident and the information below is obtained from the person in charge of the activity

- Address of injured person
- Details of the diving experience of the injured person

13.2.2 Full narrative statements from all persons (including the supervisor, diver and diver's attendant) engaged in the activities who can detain any information pertinent to the occurrence of the incident

13.2.3 Medical reports, in relation to the dive

13.2.4 The condition of the equipment immediately after the incident including appropriate case -

- Whether cylinder valves were opened or closed and to what extent;
- Remaining pressures in cylinder;
- Position of the emergency supply valve; and the type of breathing gas used.
- In any circumstance where equipment was suspected to have malfunctioned the equipment must be tagged/locked out in accordance [Isolation of Plant Procedure](#).
- In any case where a fatality has occurred, all equipment should be left in the condition it was in at the time of the accident for investigation by the regulatory authorities. Note all gas supplies should be shut off, however a description of the number of turns required to close valves and isolation procedures should be noted in narratives supplied.
- The diver is also required to log the accident in their diving log book.
- All documentation is required to be sent to OH&S and the DSO immediately.

13.2.5 Accidents Resulting In Permanent Injury, Inability to Dive Or Death.

- In the case of a fatality or serious accident requiring recompression and/or hospitalization, the Dean, Head of School, the DSO, and Manager OH&S must be notified immediately.
- When the immediate emergency has passed and all necessary steps have been taken to assist the casualty, a detailed record of the incident will need to be compiled as per section 14.2 of this procedure. While details are still fresh in everyone's mind, the Dive coordinator or another member of the team should start making notes, obtain details from other divers, record exact times, etc. (see Incident/Injury Reporting procedure for Diving) immediately proceeding the injury/fatality.

**NOTE:** The Dive coordinator may decide not to recover items if to do so would be unsafe or cause undue delay. Ensure that the Diver's Log Sheet(s) and Log Book are available for the doctor, particularly if recompression is required.

### 13.3 Emergency Plan

The Dive Coordinator for the operation must prepare an emergency response plan for the area of operation.

The Diving Emergency Protocols flow chart may be customised to fulfil this requirement.

### 13.4 Missing Diver

13.4.1 In the event of a missing diver:

- Dive buddy or team must notify the Diver's Attendant of a missing diver, e.g., five or more short blasts on a whistle is the International assistance signal;
- Diver's Attendant immediately activates their Emergency Response Plan detailing situation and requests assistance; this may include notifying the Volunteer Sea Rescue group, police and DSO;
- Mark last known position of lost diver on GPS and with an emergency marker buoy. NOTE: If any person sights the missing diver, they should maintain visual focus on that position.
- If divers are still in the water, recall divers using onboard communication systems;
- Search should begin where diver was last seen using the emergency marker buoy as reference;
- Search should be conducted in pairs;
- Sink (do not swim) to the bottom to determine effect of current and report to divers attendant immediately;
- Divers involved in search must not subject themselves to risks such as decompression illness; and
- If the diver is located, proceed with appropriate actions and notify appropriate rescue persons; and follow incident reporting procedures.

## 14. Responsibility for Implementation

### 14.1 Heads of Academic/Administrative Units

It is the responsibility of the head of academic/administrative unit to ensure that these procedures are implemented in their unit and that satisfactory provisions for health and safety are made for all scientific diving activities organized by their unit. Heads of academic/administrative units must nominate a Diving Safety Officer in writing to oversee implementation all diving activities.

### 14.2 Supervisor

The supervisor of staff or students has a particular responsibility for safeguarding the OHS of those in their charge. The supervisor can delegate the supervision or training of a staff member or student to a suitably qualified and/or experienced person, as appropriate for the task. The supervisor is, however, remains responsible for ensuring that the staff member or student has received appropriate training and has gained sufficient competency to undertake the task.

### 14.3 Diving Safety Officer (DSO)

The person who has been nominated in writing by the head of academic/administrative unit to oversee the implementation all diving activities.

14.3.1 The DSO is responsible for:

- Ensuring that the DSO is informed of all diving activities and approval has been given for all dives;
- Assisting with the planning, preparation and conduct of scientific diving activities within the Faculty/school;
- Overseeing the implementation of these procedures, assisting local safety officers in establishing diver competencies, approving dives, maintaining the Dive-Log program and maintaining equipment, facilities and diving information for scientific diving;
- The appointment of dive coordinators in writing (supporting qualifications must be recorded and maintained); and
- Termination of any dives that may present high risk or be unsafe to divers.

### 14.4 Dive Coordinators

- At all times while a diver is in the water or under pressure in a compression chamber there must be present a dive coordinator appointed by the DSO. The dive coordinator must be familiar with all legislative requirements and AS/NZS2299.2-2015
- This person must be a Monash University staff member or Monash University postgraduate student with the relevant current qualifications and appointed in writing by the DSO.
- The dive coordinator is responsible for ensuring that the dive team operates safely and follows AS/NZS2299.2-2015 and the Management of Scientific Diving Procedure for the duration of the activity.

14.4.1 The Dive coordinator is also responsible for:

- Appointing a first aider prior to the dive that has Hepatitis B vaccinations in accordance with the Monash First Aid procedures;
- Ensuring that all divers and any boat attendants hold current qualifications outlined in the Management of Scientific Diving Procedure and are competent to perform the required tasks safely;
- Ensuring that each diving operation is performed in accordance with a predetermined dive plan;
- Briefing the dive team members on dive objectives, hazards and environmental conditions likely to affect the safety of the diving operation prior to the dive;
- Addressing modifications to diving or emergency procedures;
- Discussing safety control measures with the dive team and any other person participating in the activity;
- Restricting or suspending any operation considered unsafe;
- Ensuring that a member of the team completes the Record of Dive for every dive;
- Notifying the DSO, local Safety Officer and supervisors as soon as practicable of any diving-related incidents or injuries that occurs to any member of the dive team in accordance with the [Managing OHS Hazards and Incidents Procedure](#);
- Ensuring all relevant dive equipment has current servicing records/stamps;
- Briefing the master of the dive vessel on the diving activity to be undertaken; and
- Ensuring a risk assessment has been conducted for the dive including a dive site risk assessment.

14.4.2 Ships masters agreement (Hire or contractor)

It is the responsibility of the dive coordinator to ensure the Ship Master agrees to the following prior to any dive:

- Ensure they are briefed by the dive coordinator on the dive plan prior to departure;

- Supervise the launching and retrieval of boats and ensure all relevant operational and safety equipment is on-board before the boat leaves the mother ship or shore;
- Cancel diving operations if present or anticipated weather conditions would prevent the rendering of assistance or would endanger the vessel and personnel;
- If required by the dive coordinator, post lookouts, hoist signals, warn approaching vessels and maintain radio communications;
- Ensure that no work is carried out on-board the vessel when diving is in progress if there is any possibility that it could hinder the vessel from rendering assistance in an emergency;
- Ensure that propellers cannot turn whilst divers are near the vessel;
- Ensure that fishing is not undertaken and that rubbish and sewage is not jettisoned whilst divers are near the vessel;
- Ensure that when diving operations are being carried out that personnel trained in first-aid, oxygen therapy and emergency action are on hand in the event of a diving accident;
- Ensure that sufficient medical oxygen is available for treatment of a diving accident;
- Must in the event of a diving emergency, assist the Dive coordinator in accessing all outside assistance required; and
- Are competent in the Monash University Scientific Diving Procedure; and
- Have completed the relevant Monash OHS Induction in accordance with the [OHS Induction and Training Procedure](#).

#### 14.5 Principle Researcher

Principle Researchers have a duty of care to all participants in the diving operations. They do not have to actively participate in the dive activity, but must:

- Have the knowledge to provide research collection techniques, dive site information, project requirements, protocols, risk assessments;
- Provide support and guidance during the approval process of the application to dive; and
- Monitor the conduct of staff and students and be able to enforce any suspensions deemed necessary by the DSO if there has been a breach in these procedures or any other Monash OHS procedures.

#### 14.6 Scuba Divers

SCUBA divers are responsible for:

- Diving safely within the limits of his/her capabilities and in line with these procedures. If a diver is uncertain about his/her ability to safely undertake any proposed diving task, he/she must notify the Dive coordinator.
- Conducting a functional check of their diving equipment in the presence of the diving buddy or Diver's Attendant;
- Maintaining contact with a dive buddy at all times;
- Surface with at least 50 bar of air remaining in SCUBA cylinder;
- Monitoring air supply and inform buddy at regular intervals of air supply status;
- Not diving with any malfunctioning equipment and report any faults to the Dive Coordinator;
- Maintaining all personal dive equipment and submitting proof of service to the DSO & Dive Coordinator;
- Ensuring that they are medically, physically, and mentally fit for each dive;
- Notifying the Dive coordinator as soon as possible of any diving-related injury that occurs to him/her or to his/her buddy diver;
- Maintaining an up-to-date personal dive log book and filling out the Field Record Dive Log form;
- Uploading current certifications and submitting all dives via the Dive Log Register and/or by submitting field records (signed by dive supervisor) for multiple dives;
- Conducting a functional check of his/her diving equipment in the presence of the diving buddy;
- It is the diver's responsibility and duty to refuse to dive if, in his/her judgement, conditions are unfavourable, or if he/she would be violating the precepts of his/her training, or these procedures;
- No dive team member must be required to be exposed to hyperbaric conditions against his/her will, except when necessary to prevent or treat a pressure-related injury;
- No dive team member must be permitted to dive for the duration of any known condition that is likely to adversely affect the safety and health of the diver or other dive team members;
- No diver should enter the water within 12 hours of consuming any alcohol or other intoxicants.

#### 14.7 Volunteer Divers

A volunteer diver is someone who assists on a research dive but is not necessarily directly associated with Monash University. The volunteer diver also does not hold any formal occupational dive qualifications such as a scientific diver or restricted scientific diver qualification. However must supply the DSO with their diving qualifications as outlined in this procedure.

Volunteer divers are responsible for:

- Being registered with the DSO;



- Diving in accordance with the Management of Scientific Diving Procedure;
- Supplying documentation demonstrating that their diving equipment complies with the structural and servicing requirements outlined in these procedures, if they elect to use their own diving equipment and supply these records to the DSO;
- Successfully completing the Monash University New Diver Evaluation assessment; and
- Completing the Monash University induction and [volunteer information sheet](#).

## 14.8 Diver's Attendant

Whenever a diver goes underwater the diver must be attended by a Diver's Attendant. The diver's attendant must not be engaged in any other task than that of a diver's attendant while the diver is in the water or under pressure.

14.8.1 The Diver's Attendant must be competent and have a working knowledge of:

- The Dive Plan and associated tasks;
- Signals in use;
- Decompression procedures;
- Dive tables in use; and
- Diving plant and equipment in use including all ancillary fittings.

14.8.2 Perform the following duties:

- Record the time of descent and surfacing of each diver;
- Maintain a constant vigil during a dive for divers surfacing at a distance from the boat or dive control position;
- Assist in the recovery of divers and all equipment and samples from the water;
- If tending a diver's lifeline or breathing gas hose, maintain the ability to communicate with the diver by means of that lifeline or breathing gas hose; and
- If a surface –supply compressor is in use, operate same and ensure that all equipment necessary to provide an adequate supply of air to the diver is in good working order.

14.8.3 The Diver's Attendant must **not**:

- Leave the boat at any time, to swim or snorkel, other than in an emergency or when operating in an area which allows two person diving; or
- Carry out any activities, such as read, sleep or fish, which may divert his/her attention from the responsibilities set out above.

## 14.9 Boat Operator

The Boat Operator is a key member of the dive team reporting to the dive coordinator. The Boat Operator must hold the minimum required operating ticket for the survey class of the vessel in use and must operate within the specified limits from shore.

Boat operators must ensure their vessel complies with the [Marine Safety Act](#). Boat requirements:

14.9.1 Diving flags

- Ensure the vessel displays a diving flag of size 6 of the International Flag A Code or not less than 750 mm in length and not less than 600 mm in width. (the flag may be displayed from a buoy. If displayed from a buoy, the flag must not be less than 300 mm in length and 200 mm in width.)
- Ensure the flag is visible to all vessels operating in the area.

14.9.2 Night dives

- Ensure the vessel is equipped with lights visible to 200m.
- During night time a boat must show the International lights to indicate that "a vessel is restricted in her ability to maneuver". These are three lights in a vertical line, the top and bottom are red and the middle one is white.
- The diver's boat should also show other appropriate lights such as an anchor light.

14.9.3 Personal Flotation Devices (PFD)

- Ensure PFDs meet Australian standards;
- Ensure all occupants wear PFDs unless they are wearing or in the process of donning or removing diving equipment.

14.9.4 Other safety devices

- Ensure the vessel is equipped with a propeller protector/prop guard.

14.9.5 Operator requirements:

- Ensure fuel is adequate for the trip;
- Ensure that the boat is trimmed for operation and all equipment is stowed safely;
- Have a good working knowledge of the vessel;
- Be ready and able to give assistance quickly and efficiently in an emergency if required;
- Maintain position at the dive site, usually by anchoring;
- Maintain radio communications with the research station, mother ship or shore when required;
- Maintain surveillance of the vessel and be in a position to react to any changes in its soundness;
- Constantly monitor atmospheric and sea conditions and be in a position to recall divers should adverse conditions threaten the safety of the vessel or the recovery of the divers; and
- Read and understand the Monash University Emergency Response Plan for diving and boating operations.

14.9.6 All diver and boat attendants should know that:

Most incidents, diver distress and panic situations occur at the surface, not underwater;

- If a diver surfaces away from the work site, well within the planned dive time, he may not be immediately missed, and there will be less search effort than if he is overdue.
- Depending upon surface conditions, the occupants of the attendant boat may be able to follow the diver's bubbles and keep track of his/her whereabouts. The use of a site marker is highly recommended.
- Due to the diver's low position in the water; although at times he/she may be able to see the attendant boat or mother ship, it does not follow that persons in those vessels will see him/her. In conditions where this is possible the diver must carry a device such as an inflatable "safety sausage", whistle, etc.
- Searchers in a small boat are unlikely to hear a whistle with the motor running. If it is known that the divers carry whistles, searchers should stop the motor at frequent intervals.

#### 14.10 Persons Participating in Diving Activities Coordinated By External Organisations

Persons participating in diving activities managed and/or coordinated by an external organisation must:

- Seek approval for the activity from the DSO at least 4 weeks prior to the activity occurring;
- Ensure that the diving activities fully comply with the relevant local legislation, regulations and codes of practice; and
- Ensure they meet the qualifications of a Restricted Scientific Diver

## 15. Tools

The following tools are associated with this procedure:

- Monash University New Diver Evaluation Assessment (to be developed and hyperlinked)
- Monash University SCUBA Diver Registration (to be developed and hyperlinked)

## 16. Records

For OHS Records document retention please refer to:

- [OHS Records Management Procedure](#)

## DEFINITIONS

Key word	Definition
Atmospheres Absolute:	Atmospheres absolute is the combination of atmospheric pressure and hydrostatic pressure.
Blue Water Diving:	Bluewater diving is defined as diving in open water where the bottom is generally greater than 60m deep. Such diving requires special training and the use of multiple- tethered diving techniques.
Bottom Time (BT):	The total elapsed time from when a diver leaves the surface to the time (next whole minute) at which the final ascent to the surface is commenced, measured in minutes.
Breathing Hoses:	Hoses attached to a regulator to supply breathing gas to the diver and operate at near ambient pressure.

<b>Buddy Diver:</b>	A member of a group of two or three divers.
<b>Buoyancy Control Device (BCD):</b>	A buoyancy compensator (or buoyancy control device, BC or BCD) is worn by divers to provide lifesaving emergency buoyancy both underwater and on the surface. It also provides the ability to adjust and control the diver's overall buoyancy and control whilst descending, remaining at depth and ascending.
<b>Competent Person:</b>	A person who through training, qualifications or experience (or a combination of these), has acquired the knowledge and skills to enable them to perform specified tasks safely.
<b>Compression (Recompression) Chamber:</b>	A pressure vessel at the surface designed and equipped for human occupancy which enables persons to be subjected to increased pressure for therapeutic, decompression or training purposes.
<b>DRDC:</b>	The Defence Research and Development Canada formerly known as DCIEM.
<b>DCIEM Tables:</b>	Decompression tables developed by DRDC. These tables are to be used for all diving operations.
<b>Decompression Illness (DCI):</b>	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 barotrauma of ascent.
<b>Decompression Schedule:</b>	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).
<b>Decompression Stop:</b>	The specified length of time which a diver must spend at a specified depth to allow for the elimination of sufficient inert gas from the body to allow safe ascent to the next decompression stop or the surface.
<b>Dive Controlling Position:</b>	A single designated location on the surface, adjacent to where a diver enters the water, from which the diver's safety is monitored.
<b>Dive Leader:</b>	A person in charge of a specific part of a diving operation.
<b>Diver:</b>	A person who has Australian recognised diving qualification and performs diving work underwater.
<b>Diver's Attendant:</b>	A person who remains at the surface during a dive, maintains a constant vigil of the diving operation and assists the divers entering and exiting the water and meets the requirements set out in Section 15.9 of this procedure.
<b>Dive Coordinator:</b>	The dive coordinator is a person appointed by the DSO who is responsible for coordinating any dive and is responsible for the dive team safety (AS/NZS2299.2- 2002).
<b>Diving Program:</b>	One or more dives that are related by purpose, place or time to form a series.
<b>Diving Safety Officer:</b>	Diving Safety Officer is the person responsible for overseeing the implementation of the scientific diving, boating and snorkelling activities within a faculty/division and meets the requirements set out in Section 3.1 of this procedure.
<b>Diving Team:</b>	Divers and support personnel operating together.
<b>Diving Work:</b>	Work in which diving is conducted using underwater breathing apparatus, including work by the dive team in direct support of the diver.
<b>Effective Bottom Time (EBT):</b>	For a diver carrying out repetitive diving, the bottom time calculated after taking into consideration the residual nitrogen from previous dives.
<b>Effective Depth:</b>	For a dive at altitude, the depth of an equivalent dive at sea level.

<b>Enriched Air Nitrox (EANX):</b>	EANx is air that has been enriched so that it contains more than 21% oxygen. The 'x' refers to the percent of oxygen contained in the nitrox mix. E.g. EAN36 contains 36% oxygen and EAN50 contains 50% oxygen.
<b>Equivalent Air Depth</b>	The EAD for an EANx dive is an adjusted depth that accounts for the reduced nitrogen in enriched air. Each EANx mix has a different set of EADs. These values can be taken from a Diving Science and Technology (DSAT) table, or determined using the formula: $EAD = [(1-FO_2) \times (D+10)] / 0.79 - 10$ ; where $FO_2$ = fraction of oxygen in the mix and D = depth (in metres).
<b>Exceptional Exposure Dive:</b>	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.
<b>Float Line:</b>	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.
<b>Lazy Shot (Also See Shot Rope):</b>	A rope running vertically 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.
<b>Lifeline:</b>	A line attached to a diver, which is capable of being used to haul the diver to the surface.
<b>Limiting Line:</b>	A line shown in some decompression tables, which indicates time limits (bottom times) beyond which decompression schedules are less safe.
<b>Live Boating:</b>	Where a dive boat is kept under way whilst divers are in the water is commonly known as 'working live'.
<b>Maximum Operating Depth (MOD):</b>	The MOD of a breathing gas is the depth at which the partial pressure of oxygen ( $ppO_2$ ) exceeds a safe limit. The MOD for an EANx mix is determined using the formula: $MOD = 10 \times [(ppO_2/FO_2)-1]$ ; where $ppO_2$ = partial pressure of oxygen and $FO_2$ = fraction of oxygen in the mix.
<b>Occupational Diving:</b>	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: <ul style="list-style-type: none"> <li>a) as part of a business;</li> <li>b) as a service;</li> <li>c) for research; or</li> <li>d) for profit.</li> </ul>
<b>Poor / Low Visibility:</b>	A horizontal visibility of 2 m is usually considered to be the limit below which additional precautions should be taken.
<b>Principal Researcher:</b>	The Principal Researcher is the senior academic person responsible for the diving operation and project.
<b>Quick Release Mechanism:</b>	A readily operated mechanism that enables the immediate release, e.g., of a diver's equipment, from the secured position by a single operation of one hand, but which is designed to minimise the risk of accidental release.
<b>Repetitive Dive:</b>	Any dive conducted within 18 hours of a previous dive or that has a repetitive dive factor greater than 1.0 when calculated using DCIEM tables.
<b>Repetitive Factor:</b>	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.
<b>Reserve Air Supply:</b>	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.
<b>Residual Nitrogen:</b>	Nitrogen that is still dissolved in a diver's body tissues after the diver has surfaced.
<b>Restricted Scientific Diver:</b>	An open water qualified diver with a minimum of 15 hours of underwater diving, endorsed by the Faculty/School's Dive safety officer to become a member of the research dive team. A Restricted Scientific Diver shall not dive as a restricted diver other than for a single initial period of up to 12

	months. and meets the requirements set out in section 3.4 in this procedure.
S.A.R.A.H:	<a href="#">SARAH</a> is the one stop shop for OHS related risk management and reporting.
Saturation:	The condition whereby the person's body tissues are totally saturated with the particular inert element of the breathing medium.
Scientific Diving:	Scientific diving is diving performed for the purpose of scientific research, natural resource management, or scientific research as an educational activity (AS/NZS2299.2-2002).
Scientific Diver:	A Scientific diver is a diver who conducts underwater diving research at their place of work and whose occupational diving qualifications meets the requirements set out in section 3.3 in this procedure.
Scuba Diver:	SCUBA divers for the purpose of this procedure are staff and postgraduate divers performing scientific SCUBA diving operations. This does not include undergraduates that conduct diving activities as part of their university degree.
Self-Contained Underwater Breathing Apparatus (SCUBA):	Open-circuit diving equipment that supplies the wearer with breathing gas from cylinders carried by the wearer.
Shot Rope:	A rope running vertically from the surface (dive coordinating position) and fixed to the worksite or bottom with a weight or attachment. The rope is marked with depth graduations to facilitate decompression stops at the correct depth (see also 'Lazy shot').
Surface Consumption Rate:	The divers surface consumption rate is the amount of breathing gas, in litres per minute, a diver would consume while using SCUBA equipment at the surface.
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.
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.
Undergraduate Diver:	Undergraduate students in tertiary courses are exempt from having an Occupational diving qualification to 30m when conducting diving activities. However they must have an Australian recognized open water diving qualification to conduct diving activities and meet requirements set out in Section 3.8 in this procedure.

## GOVERNANCE

Parent policy	<a href="#">OHS&amp;W Policy</a>
Supporting schedules	N/A
Associated procedures	<p><b>Australian and International Standards</b></p> <ul style="list-style-type: none"> <li>AS 2030.1 Part 1: Gas cylinders - General requirements</li> <li>AS 2815.1 :2008 Part 1: Occupational SCUBA diver—Standard</li> <li>AS 2815.6 :2013 Part 6 Restricted Occupational SCUBA diver</li> <li>AS/NZS 2299.1:2015 Part 1: Standard operational practice</li> <li>AS/NZS 2299.1 supplement : 2015 Dive medical examination</li> <li>AS/NZS 2299.2 : 2002 Part 2: Scientific diving</li> <li>AS/NZS 2299.3:2003 Part 3: Recreational industry diving and snorkelling operations.</li> <li>AS/NZS 2299.4:2005 Part 4: Film and photographic diving.</li> </ul>



	<ul style="list-style-type: none"> <li>• <a href="#">American Association for Underwater Science (AAUS) Standards for Scientific Diving. 2018</a></li> <li>• ISO 45001:2018 Occupational Health and Safety Management Systems</li> </ul> <p><b>Worksafe and other Guidance Documents</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Australian Diver Accreditation Scheme (ADAS)</a></li> <li>• <a href="#">WorkSafe Safety Alert: 2019: Occupational Diving</a></li> <li>• <a href="#">Man Overboard: Prevention and Response - Code of Practice 2010(WA)</a></li> <li>• <a href="#">NHMRC Guidelines for Managing Risk in Recreational Water (2008)</a></li> </ul> <p><b>Monash University Documents</b></p> <ul style="list-style-type: none"> <li>• <a href="#">First Aid Procedure</a></li> <li>• <a href="#">Managing OHS Hazards and Incidents Procedure</a></li> <li>• <a href="#">OHS After Hours Procedure</a></li> <li>• <a href="#">OHS Induction and Training Procedure</a></li> <li>• <a href="#">OHS Off-Campus Activities and Travel Procedure</a></li> <li>• <a href="#">OHS Records Management Procedure</a></li> <li>• <a href="#">OHS Risk Management Procedure</a></li> <li>• <a href="#">OHS Roles, Responsibilities and Committees Procedure</a></li> </ul> <p><b>Acknowledgement</b></p> <p>Thank you to the Universities of Western Australia, Queensland and Melbourne for providing the following documents which were used in the initial development of this procedure:</p> <ul style="list-style-type: none"> <li>• University of Western Australia - Scientific Diving Procedures Manual (2010)</li> <li>• The University of Melbourne – Diving Policy and procedures (2009)</li> <li>• The University of Queensland - Diving Policy and Procedures manual (2009)</li> </ul>
Legislation mandating compliance	Occupational Health and Safety Act 2004 (Vic) Occupational Safety and Health Regulations 2017 (Vic) Marine Safety Act 2010
Category	Operational
Endorsement	Monash University OHS Committee 17 November 2020
Approval	Office of the Chief Operating Officer & Senior Vice-President (a delegate of the President & Vice-Chancellor) 1 December 2020
Procedure owner	Manager, OH&S
Date effective	December 2020
Review date	2023
Version	3.1
Content enquiries	<a href="mailto:ohshelpline@monash.edu">ohshelpline@monash.edu</a>

## DOCUMENT HISTORY

Version	Date Approved	Changes made to document
1	November 2013	Management of Scientific Diving Procedure, v1.0
1.1	July 2015	Updated hyperlinks throughout to new OH&S website.
1.2	August 2017	Updated logos in header

2	December 2017	<ul style="list-style-type: none"> <li>• Updated Scope and Purpose sections to be more concise.</li> <li>• Updated Abbreviation and Definitions sections.</li> <li>• Updated all references to legislation and relevant standards throughout document.</li> <li>• Updated 'Responsibility for Implementation' section.</li> </ul>
3	December 2020	<ul style="list-style-type: none"> <li>• Simplified wording in 'Scope' section.</li> <li>• Moved information on activities requiring additional permissions, e.g. Use of SSBA to section 12.</li> <li>• Updated all references to legislation and relevant standards throughout document .</li> <li>• Removed references to documents no longer in circulation.</li> </ul>
3.1	July 2021	<ol style="list-style-type: none"> <li>1. Updated certification logo in footer to ISO 45001</li> <li>2. Updated the Standard to ISO 45001 under "Associated procedures" in the Governance table</li> <li>3. Updated OHS Policy under 'Parent Policy' to OHS&amp;W Policy</li> </ol>