

**Southern Cross University  
School of Environmental Science and Management**

**SCUBA DIVING OPERATIONS MANUAL**



**This is a working document and is subject to change**

**Prepared by Simon Hartley (Diving Officer) and Dr Danny Bucher on behalf of the  
Southern Cross University Scientific Diving Advisory Committee**

**10 February 2011**

This document is modified from the University of Wollongong SCUBA DIVING OPERATIONS MANUAL (with permission). That document was in turn modified from the SCUBA DIVING OPERATIONS MANUAL of the University of Sydney (with permission) and a draft document prepared by the working party of the NSW Scientific Divers Committee, DRAFT Version: 21 February, 2003.

The initial editing and preparation of a draft diving operation manual was done by Dr Daniel Bucher. Subsequent editing and content development has been undertaken by Simon Hartley, including extensive consultation with relevant groups within and external to the University and a review of various published sources. Published sources that informed the development of this manual include; relevant Australian Standards and existing legislation, diving operations manuals from several Australian universities (including University of Wollongong, University of Queensland, University of Sydney and University of Tasmania), commercial diver training and operations manuals (including the New Zealand School of Commercial Diver Training Diving Operations Manual) and course notes from a number of recreational dive training organisations (NAUI, SSI, PADI and GUE).

Additional input has been provided by staff and students at the School of Environmental Science and Management, Southern Cross University (SCU) from Lismore and the National Marine Science Centre (NMSC, Coffs Harbour). 2010/11 revision was undertaken by Barbara Harrison with input from Graeme Palmer, Peter Harrison, Simon Hartley and Steve Purcell, with final editing by Les Christidis and Alison King.

The contents of this manual shall be reviewed periodically as required. The maximum period between reviews shall be two years and shall be conducted by the diving officer in consultation with other SCU employees. Any changes to this manual can only be done with the approval of the Scientific Diving Advisory Committee, which is open to all staff and postgraduate students with an interest in the safe conduct of diving operations at SCU.

### **Approvals**

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## Foreword

While most forms of diving are enjoyable and safe, it is important and necessary for individual divers, accountable persons and responsible officers within the University to differentiate between diving for work and recreational diving. The need for a clear distinction is driven by; relevant Australian Standards, Work Cover guidelines and legislation (against which divers and others will be judged should an accident occur) and the unique challenges associated with occupational diving. Some of these challenges include; more rigid objectives for the diving operation, often more physically and mentally challenging diving tasks and pressures associated with completing work on time and within budget.

In scientific and other forms of commercial diving the dive site is a work place. The principal objective is to complete a specified task or group of tasks. Where dives are conducted is determined by the requirements of the particular project being undertaken. While the safety of divers is paramount, divers often accept a certain level of discomfort to get the work done, and equipment and procedures are used to mitigate any additional risks this might entail.

To achieve the tasks required during a dive (particularly where divers need to work in unison) a lot of planning and preparation is required. Divers need to ensure they are familiar with their role and have the equipment and skill necessary to perform that role. The techniques and tools used often require additional training and preparation. Unlike recreational divers, most scientific divers have a clear duty of care to other team members and have responsibilities in the planning and safe conduct of dives.

Scientific diving is often conducted in poor visibility, significant surge or current or requires longer dive times where divers might be exposed to cold. The work can involve tasks that require a lot of physical effort, such as hammering in star pickets, extracting sediment cores or carrying a lot of equipment in current. Tasks may also require a lot of concentration and situational awareness. For example, juggling a camera and survey equipment in strong surge, while keeping track of which corals have been surveyed, keeping a group of divers together, monitoring gas supply and other important dive parameters and keeping track of your location. It is important to consider this task loading in the planning and conduct of dives.

To meet the objectives of any diving operation in a safe manner I believe that the attitude of divers and the approach take by accountable persons within the University (including project supervisors) is paramount. The objectives for any diving operation should be realistic and the risks and challenges associated with working underwater fully appreciated. Sufficient resources, training and an ongoing commitment to continuing diver education and skill development is required from all involved.

This manual provides information and processes that will assist in the safe conduct of scientific diving at Southern Cross University. However be aware that...

*“No set of standard procedures can anticipate all situations that may be encountered, and as a result, no individual may assume they will be safe simply by blindly following guidelines presented in this manual. It should be noted that no manual will ever exist which can substitute for common sense, sound judgement, and a continuing concern for safety” (University of Tasmania, Diving Policies and Procedures, Version 7, June 2007).*

Safe diving,

Simon Hartley (Diving Officer)

## CONTENTS

1	INTRODUCTION.....	6
1.1	DEFINITIONS.....	6
1.2	REFERENCED DOCUMENTS.....	7
2	RESPONSIBILITIES and QUALIFICATIONS .....	8
2.1	ACCOUNTABLE PERSON .....	8
2.2	EMPLOYER .....	8
2.3	SCIENTIFIC DIVING ADVISORY COMMITTEE .....	8
2.4	EMPLOYEE .....	9
2.4.1	DIVING OFFICER.....	9
2.4.2	DIVE COORDINATOR .....	9
2.4.3	DIVE LEADER.....	10
2.4.4	DIVERS' ATTENDANT .....	10
2.4.5	STANDBY DIVER.....	11
3	REGISTRATION OF DIVERS.....	11
3.1	Scientific Diver .....	12
3.2	Restricted Scientific Diver .....	12
3.3	Visiting Scientific Diver and Visiting Restricted Scientific Diver .....	13
4	DIVE TEAMS .....	14
5	ORGANISATION, PLANNING, AND RECORDS .....	15
5.1	ACTION PLAN .....	15
5.1.1	Diver Registration .....	15
5.1.2	Dive Proposal and Risk Assessment .....	15
5.1.3	On Site Pre-Dive Check and Risk Assessment Briefing.....	15
5.1.4	Employer's Record of Dives and Diver's Personal Logbook .....	15
5.2	DIVING PROCEDURES.....	18
5.2.1	Restrictions on diving operations .....	18
5.2.2	Daily Risk assessment.....	18
5.2.3	Briefings for SCUBA diving .....	18
5.2.4	Use of decompression tables.....	19
5.2.5	Use of mixed gases (e.g. 'Nitrox', 'Trimix').....	19
5.2.6	Lost buddy procedure .....	19
5.2.7	Safety stops and ascent rates.....	20
5.2.8	Post-dive debrief.....	20
5.2.9	Diving Before or After Travel .....	20
5.2.10	Diving with other institutions and divers from other institutions .....	20

5.2.11	Incident Reporting .....	20
5.2.12	Shore dives .....	21
5.2.13	Night dives.....	21
5.2.14	Restricted visibility diving .....	22
5.2.15	Drift diving .....	22
5.2.16	Bounce diving.....	23
6	EQUIPMENT FOR DIVING.....	24
6.1	EQUIPMENT STANDARDS AND MAINTENANCE.....	24
6.2	Service and maintenance of equipment .....	24
6.3	Personal diving equipment .....	24
6.4	Safety equipment for dive team.....	25
7	SNORKEL DIVING.....	25
7.1	Other snorkel diving considerations .....	25
7.2	Size and supervision of snorkel teams .....	26
7.3	Educational and special interest groups .....	26
7.4	Briefing for snorkel diving.....	26
7.5	Other safety considerations.....	26
8	HEALTH, FITNESS AND FIRST AID .....	27
8.1.1	Health and fitness .....	27
8.1.2	Drugs and alcohol.....	27
8.1.3	First Aid For Diving Teams .....	27
	APPENDIX A - DIVER REGISTRATION FORM .....	28
	APPENDIX B – DIVE PROPOSAL AND RISK ASSESSMENT FORM.....	32
	APPENDIX C – HAZARD IDENTIFICATION & RISK ASSESSMENT .....	41
	APPENDIX D - ON-SITE PREDIVE CHECK & RISK ASSESSMENT FORM	45
	APPENDIX E - EMPLOYER’S RECORD OF DIVE SHEET .....	48
	APPENDIX F - PERSONAL LOGBOOK .....	50
	APPENDIX G – COMMUNICATION METHODS .....	53
	APPENDIX H - DECOMPRESSION PROCEDURES .....	62
	APPENDIX I - NITROX DIVING (INFORMATIVE) .....	63
	APPENDIX J – MIMIMUM DELAY BEFORE EXPOSURE TO ALTITUDE ....	64
	APPENDIX K – INCIDENT & ACCIDENT REPORT .....	65
	APPENDIX L- DAN DIVING INJURY REPORT FORM (PART).....	68
	APPENDIX M – MEDICAL/RESCUE CONTACTS.....	70
	APPENDIX N - FIELD NEUROLOGICAL EXAM.....	72
	APPENDIX O – EQUIPMENT SERVICE REQUIREMENTS .....	75

# 1 INTRODUCTION

Southern Cross University (SCU) conducts scientific diving in support of teaching and scientific research. Surface-supplied diving ('hookah', SSBA) is not presently conducted at SCU and its use is not covered by this manual.

SCU acknowledges its responsibilities as an employer under the NSW Occupational Health and Safety Act 2000, and AS/NZS 2299.2:2002 *Occupational Diving Operations Part 2 Scientific diving*. All scientific SCUBA diving operations will be conducted according to AS/NZS 2299.2:2002.

The purpose of this SCUBA Diving Operations Manual is to assist in the interpretation of AS/NZS 2299.2:2002 and to define roles and responsibilities in diving operations at Southern Cross University. Through this manual, SCU seeks to manage its obligations by identifying hazards, removing any associated risks and/or installing control measures to prevent or minimise the level of risk to the employees, students, visitors, contractors, and volunteers engaged in underwater SCUBA diving at the workplace. Employees, students, visitors and volunteers have responsibilities and obligations that are also identified in this manual.

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

This document outlines the procedures for conducting SCUBA diving operations, for scientific research or educational purposes under the auspices of SCU.

## 1.1 DEFINITIONS

### Accountable Person:

An individual, who assumes responsibility for the health and welfare of any other person in a workplace by providing instruction, direction, assistance, advice or service, is deemed an accountable person in accordance with the NSW Occupational Health and Safety Act 2000. All management and supervisory staff (including those with responsibility for students) are therefore considered "accountable persons".

### Employee:

For the purposes of this manual, employee refers to any staff member, student, contractor or visitor.

### Responsible Officer:

Deans, Heads of Division, Heads of School and Administrative Sections have been designated as Responsible Officers under the NSW Occupational Health and Safety Act 2000.

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 following this advice, but there is no obligation to follow it.
- *should consider* : a helpful hint for scientific divers

## 1.2 REFERENCED DOCUMENTS

The following publications are referred to in this manual.

- AS/NZS 2299.1:1999 *Occupational diving operations Part 1: Standard operational practice.*
- AS/NZS 2299.2:2002 *Occupational Diving Operations Part 2 Scientific diving*
- AS 2815.1-1992 *Training and certification of occupational divers Part 1: SCUBA diving to 30m*
- DR 08097 *Training and Certification of Occupational Divers Part 6: Restricted occupational SCUBA diver*

Copies of these are available for reference from the Diving Officer.

This document should be read in conjunction with the SCU Outdoor Fieldwork Safety Policy <http://www.scu.edu.au/admin/hr/procedures/index.php/86/> as that policy covers more general aspects of fieldwork that must also be taken into account when planning and carrying out scientific diving.

## **2 RESPONSIBILITES and QUALIFICATIONS**

### **2.1 ACCOUNTABLE PERSON**

Accountable Persons must ensure employees are able to undertake diving activities safely by implementing this procedure, and ensuring that appropriate records relating to diving activities are kept. For further information regarding duties of Accountable Persons please refer to the Southern Cross University Field work Safety Policy (<http://www.scu.edu.au/admin/hr/procedures/index.php/86/>).

Where an employee is required to supervise a diving activity, the Accountable Person is responsible for ensuring that delegated safety responsibilities are fulfilled and that appropriate supervision is provided.

### **2.2 EMPLOYER**

The employer shall:

- install a management process to ensure that all scientific diving activities performed by staff, students, contractors, volunteers and visitors under the auspices of Southern Cross University comply with the NSW Occupational Health and Safety Act 2000, AS 2299.2:2002 and this SCUBA Diving Operations Manual and allocate necessary resources where applicable,
- appoint and consider recommendations made by the Scientific Diving Advisory Committee,
- periodically review the management process regarding diving practices under their responsibility, and
- appoint Diving Officer(s) with the responsibilities as set out under 2.4.1.

### **2.3 SCIENTIFIC DIVING ADVISORY COMMITTEE**

Southern Cross University shall select and appoint a Scientific Diving Advisory Committee.

Membership of the committee shall include the Diving Officer, the SCU Occupational Health and Safety officer (or their delegates) and shall be open to all staff or students actively engaged in scientific diving.

The Scientific Diving Advisory Committee should:

- review relevant legislation,
- periodically review the SCUBA Diving Operations Manual,
- provide information, guidance and advice to Directors, Heads of Schools, supervisors, principal researchers, employees, staff, students and visitors regarding diving policy and practice, recommend and disseminate modifications of policy and practice to all levels of University management, staff, students and visitors,
- recommend appropriate disciplinary action in the event unsafe diving or related activities are undertaken by any individual or group within the University, and
- assist the University's Occupational Health and Safety Committee in the investigation of diving accidents and/or incidents and report violations of the University's policies and procedures to the Committee.



## **2.4 EMPLOYEE**

Employees must ensure that prior to undertaking any diving activity, they meet or exceed all requirements outlined in the SCU Outdoor Fieldwork Safety Policy and SCUBA Diving Operations Manual.

Whilst undertaking any diving activity, employees are required to undertake the activities in a manner which does not adversely affect their own health and safety, or that of others, by following such procedures. They must immediately report to the Accountable Person any matter which may affect their own or others' health and safety.

### **2.4.1 DIVING OFFICER**

SCU shall appoint a Diving Officer(s) who shall be an experienced Scientific Diver(s) trained to a level equal to or exceeding that specified in AS2815.1 (Commercial Diver) and have a certificate to that effect issued by a relevant authority. They shall have at least 100 hours of underwater diving experience in a variety of conditions and satisfy any other reasonable requirements as specified by the University. The responsibilities of the Diving Officer are described in AS/NZ 2299.2:2002.

The Diving Officer(s) shall:

- have the power to restrict, prohibit or suspend any diving operations, program or practice which he or she considers unsafe,
- have the power to require such additional safety practices, procedures or equipment as he or she thinks necessary in any diving operation,
- verify diver's competencies and record the evidence used in the verification,
- induct all divers in Lismore and at the NMSC, and
- be familiar with any legislation and guidelines that may apply to the diving operations, including AS/NZ 2299.2:2002 and this manual, and ensure that any dive proposals that he/she approves comply with the requirements of this manual.

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

### **2.4.2 DIVE COORDINATOR**

A dive coordinator is appointed in writing by the Diving Officer and shall be present at all times while a diver is in the water or under pressure in a compression chamber. The dive coordinator shall be responsible for the safe conduct of diving and shall coordinate and direct the activity of the diving teams and ensure that all diving is carried out in accordance with this manual and AS/NZ2299.2:2002. A dive coordinator may be one of the divers or on the surface team.

If the dive coordinator enters the water, then the duties which the dive coordinator has at the surface at the dive site shall be transferred to another person who shall remain at the surface and is competent to recognize and manage diving emergencies.

The dive coordinator shall further...

- ensure all divers on the dive team/s are on the University dive register,

- complete and submit for approval a dive proposal and emergency plan (if a plan is not available for the site),
- be able to recognise and manage diving emergencies and conduct pre-dive risk assessments,
- induct and assess dive leaders in either Lismore or at the NMSC (depending on origin of dive teams), and
- satisfy any other reasonable requirements specified by the organisation's Diving Officer.

A dive coordinator will:

- be ADAS certified and have at least 15 hours experience as a scientific diver (see 3.1); or
- have an occupational qualification e.g. PADI Scientific, with relevant experience (appropriate supporting qualifications e.g. Dive master or Instructor, and/or exceeding an appropriate amount of logged diving) and at least 15 hours experience as a scientific diver.

### **2.4.3 DIVE LEADER**

A dive leader is a person in charge of a specific part of a diving operation and is appointed by the dive coordinator. A dive leader shall...

- be the dive coordinator or a person appointed by the dive coordinator,
- have adequate knowledge and experience of the diving techniques, dive sites and equipment to be used,
- have an occupational diving qualification e.g. ADAS or PADI Scientific.

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.

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. The dive leader should perform pre-dive checks with their group and ensure all diving equipment (buddy) checks have been performed. The Dive Leader should also confirm that any diver feeling distressed or uncomfortable may terminate the dive at any time.

### **2.4.4 DIVERS' ATTENDANT**

Dive teams shall have a divers' attendant/surface lookout on board the boat when diving or snorkelling operations are in progress and should be capable of managing an emergency situation and providing assistance to divers. A Surface Lookout is required for shore dives.

The divers' attendant/surface lookout shall have the following qualifications:

- Current First Aid, CPR and Oxygen Administration Qualifications,

They shall have a working knowledge of:

- diving and the requirements of underwater work,

- signals in use, in particular, the systems of hand and rope signals or voice communication to be used in the diving operations,
- decompression procedures, and
- diving equipment in use, including ancillary fittings such as pressure gauges, compressors and filters.

The divers' attendant shall:

- 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 other dive control position,
- assist in the recovery of divers and all equipment and samples from the water,
- ensure that the dive flag is deployed, and
- if tending a diver's lifeline, maintain the ability to communicate with the diver by means of that lifeline.

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

#### **2.4.5 STANDBY DIVER**

A standby diver shall be present whenever a single diver is underwater in tethered mode, and shall be a qualified scientific diver trained in diver rescue 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

- in an emergency; or
- 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.

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

### **3 REGISTRATION OF DIVERS**

Every diver wishing to undertake scientific diving with the University must apply to the Diving Officer to be listed on the SCU Dive Register (Appendix A).

Divers shall be classified by the diving officer as one of the following:

- scientific diver, or
- restricted scientific diver.

### **3.1 Scientific Diver**

A scientific diver using SCUBA shall:

- have a certification as an open water diver through a certified recreational instructor, or equivalent training through another certification scheme,
- have at least 25 hours of underwater diving experience,
- demonstrate competency and satisfactory performance in diving theory and diving practical units as specified in AS/NZ 2299.2:2002. Currently acceptable avenues for demonstrating competency include:
  - a commercial diver qualification (as specified under AS2815.1) issued by an ADAS approved registered training agency,
  - an ADAS approved Scientific Diver qualification issued by an approved registered training agency,
  - a relevant statement of attainment issued by a Registered Training Organisation under the Australian Qualification Framework (AQF) and an additional 25 hours of relevant diving experience, and
  - a recreational dive master or instructor qualification from a recreational training agency, together with additional training, qualifications or experience to demonstrate competency and satisfactory performance under AS/NZ 2299.2.
- have a current occupational dive medical (as specified under AS/NZS 2299.1) issued within 12 months of the proposed dive,
- have a current Work Cover approved Senior First Aid qualification,
- have a current Oxygen Provider qualification,

### **3.2 Restricted Scientific Diver**

This category is specifically for persons who are involved in research requiring diving but who have limited diving experience and are deemed by the diving officer not to have training, qualification or experience equivalent to a scientific diver.

As a minimum, a restricted scientific diver shall-

- be 18 years of age,
- hold an open water diver certificate from a recognized SCUBA training and certifying organization,
- have a current occupational dive medical (as specified under AS/NZS 2299.1) issued within 12 months of the proposed dive,
- have at least 15 hours of post-certification SCUBA experience,
- only dive when conditions are suitable for untethered SCUBA mode,
- not dive deeper than 18 m depth,
- not dive in low visibility (<5 m), at night, in situations without direct access to the surface (e.g. caves or wrecks) or in strong currents,
- not act as a standby diver, dive coordinator or a dive leader;
- not use powered tools or lift bags,

- not dive as a restricted diver other than for an initial period of up to 12 months.

### **3.3 Visiting Scientific Diver and Visiting Restricted Scientific Diver**

There shall be full reciprocity for scientists who are qualified to dive under the auspices of scientific diving organisations outside Australia and New Zealand. The Diving Officer may register a diver as a 'visiting scientific diver' or 'visiting restricted scientific diver' as appropriate, subject to special conditions.

The Diving Officer may arrange appropriate dives at the start of a visiting diver's stay in Australia so that a person's overall competence to participate in the diving planned can be assessed.

#### **After registration, all divers shall:**

- abide by the procedures for diving as described in AS/NZS 2299.2:2002 and this manual,
- review and be familiar with the dive proposal and general risk assessment (Appendices B and C), and daily risk assessment (Appendix D) before diving,
- have training or experience relevant to the tasks to be performed and the anticipated conditions on the proposed dive,
- dive in accordance with the pre-dive plan,
- act as a buddy diver during the dive to others in his or her designated buddy group, unless diving alone in tethered SCUBA mode. Free-swimming buddy divers shall maintain effective two-way communication with each other at all times while in the water and be able to render immediate assistance,
- be familiar with the method of signalling required for a dive operation (hand, light, line and touch signals).

## 4 DIVE TEAMS

<b>Open and enclosed waters (untethered)</b>	<b>Open and enclosed waters (tethered)</b>
1. Skipper 2. Divers attendant  Either of the above will also act as dive coordinator*	1. Skipper 2. Divers attendant  Either of the above will also act as dive coordinator  3. Standby diver
3. Dive leader  4. Scientific diver (5. Restricted diver)	4. Scientific diver (tethered mode)

Table 1: Minimum dive team requirements for vessel based operations  
(shaded area indicates surface team)

Dive teams of two may be approved for sheltered open water subject to the conditions given in Section 5.2.3 of AS2299.2:2002.

The Skipper may be authorised to act as the Divers' attendant in good conditions and if the boat can be securely anchored or moored.

<b>Shore dives (untethered)</b>	<b>Shore dives (tethered)</b>
1. Dive coordinator*  2. Divers attendant	1. Dive coordinator /divers attendant 2. Standby diver
3. Dive leader/standby diver  4. Scientific diver/standby diver (5. Restricted diver)	3. Scientific diver (tethered mode)

Table 2: Minimum dive team requirements for shore diving  
(shaded area indicates surface team).

\* The Dive Coordinator may act as either the diver's attendant, dive leader or as a diver. If the Dive Coordinator enters the water, the surface duties of the Dive Coordinator are transferred to another person who shall remain at the surface and is competent to recognise and manage diving emergencies.

## **5 ORGANISATION, PLANNING, AND RECORDS**

### **5.1 ACTION PLAN (see Fig 1)**

#### **5.1.1 Diver Registration – see Appendix A**

All staff, students, visitors, contractors and volunteers who are required to SCUBA dive in diving operations conducted by Southern Cross University must register and be approved for diving by the Diving Officer.

#### **5.1.2 Dive Proposal and Risk Assessment – see Appendices B and C**

The Dive Proposal must be approved by the Diving Officer before every diving operation, and must be completed and submitted to the Dive Officer prior to commencement of 1<sup>st</sup> dive. Sufficient time must be allowed for the Diving Officer to fully assess the proposal. It comprises a dive plan, risk assessment and emergency plan.

All potential dive team members are to be included on proposal, (even if they are not on the 1<sup>st</sup> dive). The proposal may be for the entirety of the research proposal so should include all possible sites, dive co-ordinators, scenarios etc.

The proposal will be approved for the duration of the project on the proviso that a daily risk assessment is completed prior to each dive and the dive cancelled if conditions are such that they no longer meet the original approval requirements. These assessments are to be undertaken by the dive co-ordinator of that particular dive.

The approved dive proposal and risk assessment form shall then be forwarded to either the Head of School (Lismore based staff and/or students) or the Director of the NMSC (NMSC based staff and/or students).

A signed copy of the Dive Proposal must be taken to the dive site. A signed copy must also be shown to the relevant technical staff member in order to borrow University diving equipment.

#### **5.1.3 On Site Pre-Dive Check and Risk Assessment Briefing – see Appendix D**

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 risk assessment. On-site variations to the Pre-Dive Check and Risk Assessment shall be authorised by the dive coordinator but must also be lodged with the Diving Officer on return to the Southern Cross University.

#### **5.1.4 Employer's Record of Dives and Diver's Personal Logbook – see Appendices E and F**

At the end of a diving operation the Dive Coordinator shall deposit with the Diving Officer, an Employer's Record of Dive sheet (Appendix E). This log sheet tracks the gas consumption, depth and duration of dives, repetitive groups and activities of all divers. The log sheet should be signed by all divers and the dive coordinator.

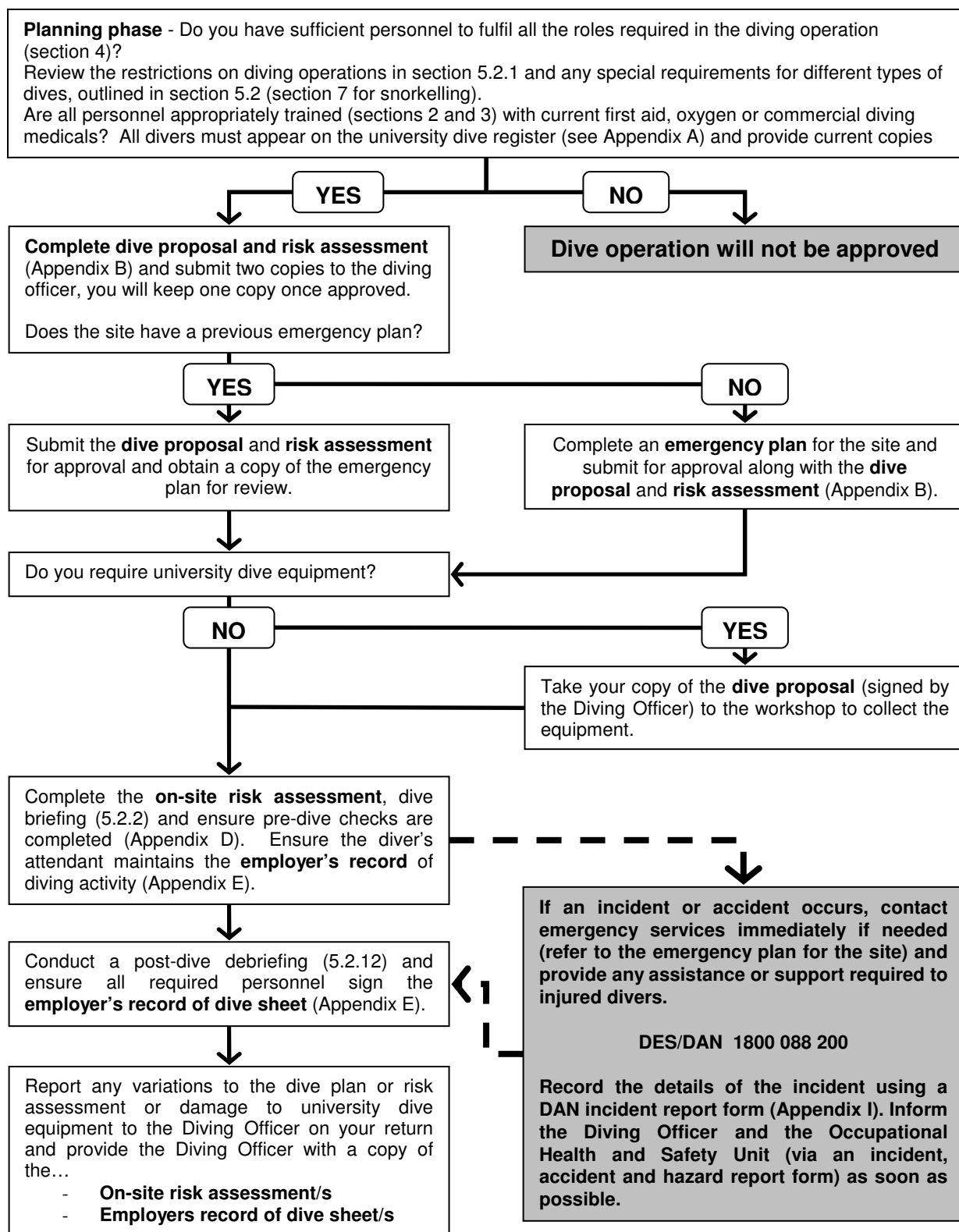
All divers shall keep and maintain a permanent record of all diving undertaken for the duration of the diver's working life (see Appendix F). The diver's permanent record of diving usually takes the form of a logbook, which shall include:

- next of kin information,
- diver's name, current address, date of birth and signature,
- training and certification details,

- a record of medical examinations conducted for the purpose of scientific diving,
- a record of diving activity undertaken, and
- a record of accidents and incidents including decompression treatment(s).

The diver's personal logbook should be signed by the Dive Coordinator for verification.





**Figure 1: This flow chart provides a quick reference for dive coordinators, showing required paperwork for different stages in a diving operation.**

## **5.2 DIVING PROCEDURES**

### **5.2.1 Restrictions on diving operations**

Diving operations shall only be carried out when:

- all divers have registered and been approved to dive by the Diving Officer,
- a dive proposal and general risk assessment has been lodged and approved by the Diving Officer and either the Head of School (Lismore based staff) or Director of the NMSC (NMSC based staff),
- all other requirements under the SCU outdoor fieldwork policy have been met,
- the dive does not involve planned decompression stops,
- the maximum depth does not exceed 30 m, and
- the dive does not involve diving in any overhead environment, such as a wreck, cavern or cave, unless all members of the dive team are appropriately trained and equipped.

### **5.2.2 Daily Risk assessment**

Upon arriving at the dive site the dive coordinator shall complete a daily risk assessment Appendix D. This risk assessment should be discussed with all divers and surface support personnel as part of the dive briefing. The dive coordinator, dive leader/s and divers are required to sign the daily risk assessment.

### **5.2.3 Briefings for SCUBA diving**

The dive coordinator for each dive is responsible for conducting a pre-dive briefing before each dive and discussing the on-site risk assessment in the presence of the entire dive team and support personnel. The content of this briefing shall include the following information and must be modified according to the dive site;

1. Objectives of the dive, assignment of dive teams and roles for each diver in the team(s),
2. Allocation and description of task for each dive team member,
3. Complete details of the dive plan,
4. Water conditions, including currents, visibility, seafloor conditions, etc,
5. Equipment to be used during the dive (including any special equipment and considerations) and the location of oxygen, first aid and other safety equipment,
6. A review of communication signals required for the dive (Appendix G),
7. Lost buddy procedure,
8. Conditions controlling the termination of the dive (time, remaining gas supply, etc),
9. Review of the risk assessment and mitigation,
10. Emergency response plans, and
11. Soliciting questions to ensure that all divers understand their role, tasks and the conditions under which the dive will be conducted.

When surface conditions (e.g., rough seas) make briefings difficult, they may be conducted on shore immediately prior to departure. However, the on-site risk assessment shall be

reviewed when divers arrive at the dive site and any changes conveyed to the divers and surface personnel. Pre-dive checks should be conducted at the dive site.

The dive leader should undertake the following checks immediately prior to each dive:

- Check all divers are fit to dive,
- Review dive plan (briefly),
- Check the divers' main air supply is switched on,
- Review divers equipment,
- Modified S-Drill,
- Confirm all divers can equalise and
- Bubble check

Depending on the surface conditions some of these checks may be conducted in the water prior to descending.

All checks shall be recorded on the On Site Pre-dive Checks and Risk Assessment form.

#### **5.2.4 Use of decompression tables**

All dives including repetitive dives must be calculated using DCIEM tables (Canadian Defence and Civil Institute for Environmental Medicine). Divers should note that UDT, the licensee and manufacturer of DCIEM tables have recommended amendments covering the use of these tables (see Appendix H).

Maximum bottom times must be reduced according to Table 3.1 AS/NZS 2299.2:2002 if diving is conducted without a recompression chamber on site (see Appendix I). Dive computers may be used for the diver's own information but are not a substitute for standard tables and pre-dive planning.

#### **5.2.5 Use of mixed gases (e.g. 'Nitrox', 'Trimix')**

Use of these gas mixtures will be approved only for suitably trained divers using appropriate equipment, and only where their use will impart greater safety than diving with air (see Appendix I). Consideration may also be given to the need to reduce nitrogen narcosis to ensure the validity of complex data collected at depth. As a general rule, divers using gas mixtures reduced in nitrogen will be required to follow decompression tables for air diving. Mixed gases shall not be used to extend dive times, shorten surface interval or increase depth limitations beyond the no-decompression limits of air diving.

#### **5.2.6 Lost buddy procedure**

Where dive buddies lose contact with each other during that dive, the standard procedure taught on most 'open-water' diving courses in Australia should be followed:

- on losing contact with their buddy, each diver should swim in a small circle, looking for the buddy, or their exhaust bubble trail (often easier to see if looking up slightly),
- then, if visual contact is not established, each diver should ascend 3 - 5 m, and repeat the procedure, and
- If contact is still not re-established, each diver should surface (at a rate of no more than 9 m/minute). On regaining contact at the surface the dive may be recommenced or terminated, at the discretion of the dive coordinator or dive leader.

If a diver is still missing more than 5 minutes after his/her buddy surfaces, an immediate search should be instigated where it is safe to do so, and continued until either the diver is located or the searching divers deem that further assistance is required.

**NB: Lost buddy procedures shall be discussed in every pre-dive briefing.**

### **5.2.7 Safety stops and ascent rates**

For all dives of greater than 9 m in depth, and on dives between 7 m and 9 m longer than 180 minutes duration, divers shall (where safe and practical) do a safety stop(s) of 3-5 minutes between 3 m and 6 m.

It is recommended that divers adopt an ascent rate of slower than 9 m per minute when surfacing after any dive to 30 m or less. A reduction in ascent rates has been shown to be beneficial in reducing the risk of DCI in divers. Divers' ascent rate is advised not to exceed 3 m per minute from 9 m to the surface.

### **5.2.8 Post-dive debrief**

After every dive, the dive coordinator must conduct a post-dive debrief with all personnel on the trip, including the following;

1. Check the health of all divers,
2. Noting all tasks achieved,
3. Recording equipment problems encountered where necessary, and ensuring equipment is labelled for repair,
4. Notify each diver of their dive details including bottom time and maximum depth, and
5. Ensure that each diver checks and signs the Employer's Record of Dive sheet (Appendix E).

### **5.2.9 Diving Before or After Travel**

When diving after travel, the diver shall have had adequate rest before 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) – see Appendix J.

### **5.2.10 Diving with other institutions and divers from other institutions**

When a dive operation is conducted by Southern Cross University all divers must be registered with Southern Cross University and follow the procedures outlined in AS/NZS 2299.2:2002 and this Manual.

When Southern Cross University divers participate in diving operations conducted by another institution, they must follow the procedures outlined in AS/NZS 2299.2:2002, this Manual and the procedures of the host institution conducting the diving operation.

### **5.2.11 Incident Reporting**

All unusual incidents, unexpected hazards, accidents and injuries must be reported as soon as possible. The University's Incident, Accident and Hazard Report Form (Appendix K) shall be used for reporting all incidents as per the University's Policy on Accident Reporting. A DAN incident report must also be completed for diving-related incidents and submitted to the Diving Officer ( Appendix L).

In addition, 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 relevant contacts at the University. Appendix M contains important medical and rescue contact details, whilst Appendix N provides a simple field neurological exam which may prove invaluable to the treating doctor.

The Dive Coordinator must investigate all incidents, hazards, injuries and breakdowns with the 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 diving accidents and incidents can be found in Section 7 of AS/NZS 2299.2:2002.

When an event occurs that 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 OHS Unit. 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.

### **5.2.12 Shore dives**

In addition to normal diving procedures, the following procedures shall be followed for a shore dive:

- The dive coordinator should consider factors such as; wave conditions, currents, submerged obstacles and the risks associated with entry or exit over rocks, man-made structures and other substrata before deciding on appropriate entry and exit points,
- Dive teams should have at least one alternate exit point from a shore dive if conditions prevent divers using the primary exit point,
- Consider choosing an exit point away from areas of boat traffic. Divers may choose to use guide lines to assist them in navigating to a safer location to surface. Divers may also consider carrying a redundant gas supply or diving thirds (i.e. a third at start of dive, a third at end of dive and a third as reserve) to ensure they have sufficient gas to surface away from vessels,
- When diving in water of less than 3 m depth, a large dive flag shall be positioned immediately above the dive site, either in a boat, or through use of a float supported flag - particularly in areas where there is a high level of danger from boat traffic (such as near boat ramps). Consider marking the boundary of the dive site with appropriate surface floats, and
- When diving from shore, either a large dive flag shall be placed on the shore to indicate the position of the dive site, and one diver from each buddy group involved on the dive should tow a smaller dive flag on a surface float to indicate the position of that buddy group at all times, OR a large floating flag shall be towed by the divers.

### **5.2.13 Night dives**

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

- a competent surface lookout/diver's attendant is mandatory,
- night dives to depths greater than 18 m will only be approved in exceptional circumstances,
- the surface lookout must have a powerful white light suitable for signalling divers and passing vessels
- any boat used for night diving shall have a working anchor light,

- the entry and exit points shall be adequately and distinctively illuminated,
- every diver shall carry at least two lights (one primary and one backup), three is preferred (two backups) and should have a cyalume stick or other permanent light (visible in a 360 degree arc) attached in a prominent position. Backup lights shall use non-rechargeable batteries only, primary lights may have rechargeable batteries,
- every diver should carry a compass,
- a powerful torch is mandatory for night diving, and useful for low visibility or general open water diving to facilitate effective team cohesion and rapid communication. General guidelines for using underwater torches are provided in Appendix G. Divers should generally use torches of similar strength. The team member with the weakest light (or a diver who has been forced to switch to a backup) should be placed in the lead.

#### **5.2.14 Restricted visibility diving**

Restricted visibility diving is defined as any dive where the underwater horizontal visibility is between zero and 2 m. In addition to normal diving procedures, the following procedures shall be followed for limited visibility diving:

- Every diver shall carry a compass,
- Divers shall either dive in tethered mode or use a guide line when the visibility is less than 1 m (a guide line is recommended for all restricted visibility dives or when navigation may be difficult and divers must return to the same entry/exit point),
- Divers shall dive in tethered mode in severely restricted visibility, where they cannot effectively monitor dive time and gas consumption,
- Divers shall review hand, line (if diving in tethered mode), light (if used) and touch signals immediately prior to the dive (Appendix G),
- When using a guide line, divers should generally dive thirds and leave sufficient gas reserves to reel in guide lines at the end of the dive, and
- The use of an alternate air supply (pony cylinder or twin tanks) and effective surface communications (comms) should be considered if there is a risk of entanglement or a direct ascent could be hazardous.

Other useful adjuncts to restricted visibility diving include the line arrow and finger/safety spool. Line arrows are isosceles triangles placed on the line with the arrow pointing in the direction of the exit (boat). Finger/safety spools are small spools (or sometimes reels) with up to 30 to 50 m of line. Spools can be used to establish a fixed point to search for a lost guide line or to make short side trips by tying off to the main guide line. They can also be used to perform search patterns to locate lost equipment or divers. *A safety spool or other suitable rope or line should be available at all dive sites to allow search patterns to be conducted for missing divers.*

#### **5.2.15 Drift diving**

A drift dive is any dive where the exit point is different to the entry point. Drift diving is usually the preferred approach when currents are too strong for a diver to effectively hold their position in the water without physical contact with moorings or the bottom. If divers must return to the same entry and exit point in current then a guide line is often advisable and divers should generally conduct the dive in such a way that they swim into the current at the start of the dive and return to the exit point (boat) with the current. Sufficient gas reserve should be maintained to return to the exit point and take in any guide lines.

The following procedures shall be followed for drift diving:

- team members shall have a good understanding of local current conditions (long shore, tidal current, etc) including strength and direction, the layout of the dive site (particularly when they may drift into areas with hazardous surface conditions), potential hazards associated with diving in current and effectively communicate dive parameters (including direction, depth and duration of the dive) to all team members and surface support,
- divers shall demonstrate effective buoyancy control and trim and should be able to deploy surface markers from depth in the event of team separation,
- one of the divers should be equipped with a light line attached to a small surface float to enable the boat operator to stay in the vicinity of the divers (an inflatable torpedo float and cave line, deployed from an open reel, is recommended),
- a dive flag shall be displayed on the boat throughout. The boat operator shall keep track of vessels in the vicinity, and divert any coming too close to the divers. If the boat operator loses sight of the surface float he/she should immediately reference the teams last known position and undertake a search in the direction divers were travelling, and
- in addition to normally-required dive gear, each diver shall be equipped with a surface marker and safety spool and trained in its use.

Divers should promptly leave the surface and descend together as team cohesion is the overriding priority. Team members should wait for or assist any diver experiencing a problem on descent (such as difficulty equalising). The absence of descent and ascent lines will mandate effective buoyancy control throughout the dive (including adding air to a BC to control the descent). During the dive divers must be aware of their surroundings and the speed and direction of travel (mindful of the fact that they may approach objects more rapidly than usual increasing the risk of collision and injury). Team members should only stop if other team members can be signalled and are able to also stop. If a team becomes separated, following a brief search, they should immediately begin their ascent. Divers who are separated from the surface float should deploy a surface marker during their ascent to prevent themselves drifting too far from the support vessel before they are sighted.

Divers should generally approach the vessel from up wind (or up current) to avoid injury and follow the surface crews instructions on boarding the vessel.

### **5.2.16 Bounce diving**

A bounce dive is defined as the diver returning to depth briefly immediately following a working dive (after a very short surface interval). Typical examples may include a diver submerging to recover a weight belt, camera or other equipment or release an anchor line. For the purposes of this discussion freediving (or descending to depth on snorkel) will also be defined as bounce diving. Bounce diving is a particularly hazardous activity as bubbles that commonly occur immediately following a dive, that would otherwise be trapped by the lungs, may bypass the lungs and enter the arterial system. This shunt may result in particularly serious neurological DCS symptoms including paralysis, loss of consciousness and death.

**NB. The practice of bounce diving shall not normally be permitted on approved university dives.**

## **6 EQUIPMENT FOR DIVING**

### **6.1 EQUIPMENT STANDARDS AND MAINTENANCE**

Each member of the diving team must know the capabilities and limitations of any equipment used. Equipment shall not be altered, modified, or changed in any way that might impair its safe and efficient operation.

All diving equipment (both personal and University equipment), including cylinders, regulators and accessories necessary for the safe conduct of the diving operation must be:

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

### **6.2 Service and maintenance of equipment**

Regulators, buoyancy vests, gauges and metering equipment shall be serviced at least to the manufacturer's requirements. Any reported malfunction must be rectified before further use.

Dive proposals will not be approved without documentation of regular servicing of equipment (see Appendix O).

Records of maintenance and testing of SCUBA equipment owned by Southern Cross University will be kept by the School of Environmental Science and Management for at least two years.

### **6.3 Personal diving equipment**

Each diver shall use the following equipment:

- open-circuit SCUBA tank complete with demand regulator (first and second stage),
- face mask,
- swimming fins,
- snorkel for surface swimming,
- weight belt (good quality riveted stainless steel buckle with heavy-duty flange recommended) or integrated weight system with quick release closure (not recommended),
- submersible contents gauge for measuring remaining air pressure in cylinder,
- wetsuit, drysuit or other protective clothing appropriate to the condition of work and the temperature of the water,
- buoyancy compensator of an approved design that is inflatable by mouth and by a compressed air cylinder,
- alternative air source, either a second stage regulator (recommended), a pony bottle, or a second stage regulator incorporated into the oral inflation hose of the buoyancy compensator (not recommended).
- watch or elapsed time indicator or dive computer,
- depth gauge or dive computer,



- compass,
- divers knife,
- dive light (optional, two lights (primary and backup) required for night diving),
- open dive reel with up to 100 m of line (optional, may be required for restricted visibility diving or in difficult to navigate terrain),
- safety spool (optional, required for drift diving), and
- safety sausage or similar surface marker.

#### **6.4 Safety equipment for dive team**

The following equipment shall be available at the dive site

- oxygen resuscitation equipment with sufficient gas to supply at least two divers until medical assistance can be reached,
- first aid equipment,
- a mobile phone and VHF, HF or 27Mhz radio if boat diving (together with emergency contact information),
- at least 50 metres of rope or line for conducting search patterns,
- waterproof torch (required for surface support on night dives only),
- snorkel for surface searches,
- A copy of the dive proposal and risk assessment, emergency plan, this manual and AS2299.2:2002. In addition, spare copies of the daily risk assessment and employer's record of dive forms should be available on site,
- dive flag, and
- fresh drinking water.

### **7 SNORKEL DIVING**

As a general guide, snorkel diving by SCU personnel should only be used as an observation and/or light recovery or collection technique. No difficult or strenuous work of any kind should be attempted using snorkel diving, without implementation of appropriate safety precautions and the written permission of the University Diving Officer.

An individual wishing to participate in snorkelling activities through the University must be listed on the University Diver Register (see Appendix A) and must satisfy the Diving Officer of their fitness to take part in the proposed activity. Requirements for listing on the diver register as a snorkel diver include:

- be 18 years of age, hold an open water diver certificate from a recognized SCUBA training and certifying organization and have at least 20 hours of post-certification SCUBA experience after certification OR hold an approved certification or certificate of competency in snorkel diving from an approved training agency,
- have a current recreational diving medical, and
- perform an in-water assessment if required by the Diving Officer.

#### **7.1 Other snorkel diving considerations**

Snorkel divers should also be reasonable swimmers, comfortable in the water, and observe common sense rules regarding boating and swimming safety. Inexperienced snorkellers

must undertake a snorkel diving familiarisation course with the Diving Officer or delegate, and should initially practice snorkelling in either a swimming pool, or other sheltered, shallow waters, until they attain enough confidence to swim in deeper water.

## **7.2 Size and supervision of snorkel teams**

The minimum size of a snorkel team performing low risk tasks in low risk shore based conditions is two, which could comprise either a snorkeller and a surface lookout, or two buddy snorkellers (in this case, both divers must remain in visual contact with each other at all times during the activity). In areas where there are higher risks or for any boat based work, the snorkel team shall consist of either one snorkeller and a surface lookout, or two buddy snorkellers and a surface lookout, depending on the experience of the snorkel team and the task being undertaken (as assessed by the Diving Officer or delegate).

Irrespective of the size of the snorkel team, all members should be paired up (with experienced snorkellers with novices or inexperienced snorkellers) and remain within sight of each other at all times.

The Dive Coordinator must make allowance for the fact that the level of fitness required for safe breath hold diving is higher than that for SCUBA diving.

Where large groups (i.e. > 10 people) conduct snorkelling operations, there must be at least one person on watch at the surface for every ten divers. The surface lookout/s must perform a regular head count, and must be capable of going to the assistance of any person in difficulties. Surface lookout/s must be equipped with a whistle, and the group must be informed that if the whistle is sounded, all snorkellers must return to the beach/boat. All snorkellers must be paired up (experienced with novice if possible) and pairs must stay together during the dive.

First aid and oxygen equipment and trained operators must be on site while any diving operation is in progress.

## **7.3 Educational and special interest groups**

Where educational or special interest groups from outside the University are operating in University workplaces they may forgo the requirement of diver registration, by evaluating the competence of their snorkellers themselves, and supplying a complete listing of all persons who are to be involved in any proposed diving operation. A dive plan must be provided to the Diving Officer, and all other SCU snorkelling guidelines must be followed.

## **7.4 Briefing for snorkel diving**

Before commencement of any snorkel diving operation, a briefing must be given by the Dive Coordinator, to ensure that all those involved are familiar with important information such as dive objectives, area of operation, environmental conditions, problems that may be encountered, surface signals, emergency procedures, etc. The Dive Coordinator's pre-dive briefing in section 5.2.3 may be adapted for this purpose, but it must include details of any agreed recall signal (e.g. whistle). Risk assessments should be completed and discuss as part of the briefing.

## **7.5 Other safety considerations**

A dive flag must be displayed adjacent to any snorkelling site at all times. The wearing of a safety line is mandatory where the snorkeller is the only diver at the site.

The safety line must be at least 5 m greater in length than the maximum depth of the water around the dive site, and the float should be large enough and of such a colour to be easily visible. If possible, a small dive flag should be attached to the surface float.

Given the very real dangers of shallow water blackout, divers participating in breath hold diving activities should take great care to not exceed their personal limits. No diver should exceed 15 m depth at any time.

**NB. No snorkel diving other than surface observation (where the diver remains at the surface at all times) is to be undertaken by any diver who has a repetitive factor (RF) of greater than 1.1 from previous compressed air diving operations (refer to section 5.2.13).**

During snorkel diving operations, at least one person must be adequately trained in first aid. In addition, oxygen resuscitation equipment must be on site, along with a person certified in the use of such equipment and an adequate supply of medical grade oxygen.

**NB. Snorkelling is prohibited in areas of high boating traffic, e.g. around boat ramps or in shipping channels.**

As with SCUBA divers, snorkel divers must wear suitable protection from environmental conditions such as cold, sun, marine animals, abrasions etc. However, the use of drysuits for snorkel diving is not recommended (other than for surface observations, where no actual diving underwater takes place).

## **8 HEALTH, FITNESS AND FIRST AID**

### **8.1.1 Health and fitness**

All Scientific Divers must be certified as medically fit to dive in accordance with the requirements of AS/NZS 2299.1:1999 (see appendix L of the Standard). A certificate of fitness to dive shall have been issued within 12 months prior to diving by a medical practitioner appropriately trained in underwater medicine.

### **8.1.2 Drugs and alcohol**

Divers should consult a medical practitioner appropriately trained in underwater medicine regarding any medication they intend to take while diving.

Alcohol should not be consumed within 12 hours prior to diving and shall not be consumed until after all diving operations for the day have concluded. At all times, especially when diving over multiple days, alcohol should only be consumed in moderation, if at all.

### **8.1.3 First Aid For Diving Teams**

Details of minimum First Aid qualifications are dealt with in the appropriate Diver's Classification sections.

- **APPENDIX A - DIVER REGISTRATION FORM**

# SOUTHERN CROSS UNIVERSITY - DIVER REGISTRATION FORM

(page 1 of 3)

Full name: .....  
Address: .....  
.....  
Date of birth: .....  
Phone (include mobile if available): .....  
Email: .....

Please indicate which of these best describes your position at SCU:

Permanent staff  Undergraduate/honours student   
Temporary staff  Postgraduate student   
Visitor  Volunteer

Supervisor name (Integrated, honours or postgraduate students only): .....

Visitors please state your home institution: .....

## NEXT OF KIN

Name: .....  
Address: .....  
Phone (include mobile if available): .....

## APPLICANTS SCUBA QUALIFICATIONS (attach copies)

(List SCUBA qualifications and date achieved, also include; Specialty training courses, Mixed gas training and Commercial Diving qualifications under AS2815 if you have them).

Entry level diving qualification:..... Date: .....\*

Advanced course (list specialties): .....  
..... Date: .....\*

Rescue Diver: ..... Date: .....\*

Restricted Visibility Diver..... Date: .....\*

Scientific/Commercial Diver:..... Date: .....\*

**\* NB. Required training for a diver without ADAS commercial or ADAS scientific diver qualifications to be approved as a "Scientific Diver" or "Visiting Scientific Diver".** Navigation, Night dive, Search and Recovery, Deep and Peak Performance Buoyancy specialties (or equivalent) required for Advanced.

# SOUTHERN CROSS UNIVERSITY - DIVER REGISTRATION FORM

(page 2 of 3)

Other scuba qualifications:

Qual: ..... Date: .....

Qual : ..... Date: .....

Qual : ..... Date: .....

Qual : ..... Date: .....

**MOST RECENT FIRST AID / CPR (must be current, attach copy)      Date : .....#**

**MOST RECENT OXYGEN PROVIDER (must be within 12 months, attach copy)**

**Date : .....#**

## DIVING HISTORY

NUMBER OF DIVES : ..... HOURS LOGGED : ..... LOG BOOK SIGHTED Y / N

Dives in past 12 months: .....

## PERSONAL DIVING EQUIPMENT

Do you intend to use your Personal Diving Equipment for Scientific/Research Diving: Yes / No

Has your Personal Diving Equipment been SERVICED and SPG CALIBRATED in the past 12 months: Yes / No

## MEDICAL HISTORY

Most recent commercial scuba medical: (AS/NZS 2299.1, must be within 12 months, attach copy)

Date : .....#

("Snorkel Divers" only - Most recent recreational scuba medical: (must be within 12 months, attach copy) Date : ..... )

Do you have any Medical Condition that may interfere with your diving SAFELY: Yes / No

If YES, please give details: .....  
.....

Have you been involved in a diving related accident?: Yes / No

If YES, please give details: .....  
.....

**# NB. Indicates required ongoing training or assessment for a diver to be approved as a "Scientific Diver".**

# SOUTHERN CROSS UNIVERSITY - DIVER REGISTRATION FORM

(page 3 of 3)

**NB. The following criteria will be used in determining diver classification.**

Scientific / Visiting Scientific Diver	Restricted / Visiting Restricted Scientific Diver	Snorkel Diver
<ol style="list-style-type: none"> <li>1. basic diver certification,</li> <li>2. at least 25 hours of diving experience,</li> <li>3. one of the following qualifications; 1) ADAS commercial (AS2815.1) or Scientific Diver, 2) AQF Scientific Diver certificate of competency plus over 50 hours of relevant scientific diving experience, or 3) DM /instructor qualification with additional training or qualifications to demonstrate competency under AS/NZ 2299.2:2002.</li> <li>4. current AS/NZS 2299.1 dive medical,</li> <li>5. current Work Cover Senior First Aid,</li> <li>6. current Oxygen Provider, and</li> <li>7. meets other requirements as laid out in section 3.1 of the SCU SCUBA Diving Manual.</li> </ol>	<ol style="list-style-type: none"> <li>1. be 18 years of age,</li> <li>2. basic diver certification,</li> <li>3. have at least 20 hours of post-certification diving experience, current AS/NZS 2299.1 dive medical, and</li> <li>5. meets other requirements as laid out in section 3.2 of the SCU SCUBA Diving Manual.</li> </ol>	<ol style="list-style-type: none"> <li>1. meets criteria 1-3 for a Restricted Scientific Diver, OR holds a current certification or certificate of competency in snorkel diving from an approved training agency,</li> <li>2. current recreational diving medical, and</li> <li>3. meets other requirements as laid out in section 7 of the SCU SCUBA Diving Manual.</li> </ol>

**Dive coordinator / Dive Leader:** In addition to the above requirements for a Scientific or Visiting Scientific Diver, Dive Coordinators and Dive Leaders will be approved based on the criteria laid out in section 2.4.2 and 2.4.3 respectively of the SCU SCUBA Diving Operations Manual. An ADAS qualification or DM/instructor qualification with relevant experience is usually preferred.

It should further be noted that for most diving operations at least one member of each dive team and one member of the surface support team should be qualified in diver rescue.

*I ....., have read the Southern Cross University SCUBA Diving Operations Manual and AS2299.2:2002. I agree to abide by the guidelines and procedures laid out in the SCU SCUBA Diving Operations Manual and under the Australian Standard for Scientific Diving. I undertake to maintain a current dive medical while diving with SCU and will only dive when I am medically fit to do so. If I am approved as a "Dive Coordinator", "Scientific Diver" or "Visiting Scientific Diver" I further agree to maintain a current oxygen provider (12 months) and Workcover approved First Aid/CPR qualification and provide evidence of this to the Diving Officer.*

Signature:..... Date:.....

**Approved as :-**

**Dive Coordinator / Scientific / Restricted Scientific / Visiting Scientific /  
Visiting Restricted Scientific / Snorkel Diver**

**Diving Officer's Signature:** ..... **Date:** .....

**APPENDIX B – DIVE PROPOSAL AND RISK  
ASSESSMENT FORM**



# SOUTHERN CROSS UNIVERSITY - DIVE PROPOSAL and Risk ASSESSMENT for SCUBA

**Dive Coordinator/s:** .....

.....

.....

**Date/s of last medical/s (AS2299.1):** .....

.....

**Contact Phone Number/s:** .....

.....

**Email/s:** .....

.....

**Mobile and/or satellite number/s (to be available on site):** .....

.....

**List of dive team members and their role** (all must be registered with the Diving Officer, have current medical certificates and meet other requirements as specified under the SCU SCUBA Diving Operations Manual and AS/NZS 2299.2:2002)

Name and role:		Date of last medical:	
Name and role:		Date of last medical:	
Name and role:		Date of last medical:	
Name and role:		Date of last medical:	
Name and role:		Date of last medical:	
Name and role:		Date of last medical:	

**Dive location** (be as specific as you can, include GPS coordinates and a map if possible):

.....

.....

.....

**Dates** From ..... to .....

**Type of dive(s)** e.g. boat (incl. name of boat), shore, drift

.....

.....

# SOUTHERN CROSS UNIVERSITY - DIVE PROPOSAL and Risk ASSESSMENT for SCUBA

**Dive Profile** Specify as far as possible intended depth and duration of proposed dive(s). Include expected repetitive group/s at end of dive/s (using DCIEM tables). Where diving is conducted over a number of days please provide a typical daily schedule and any contingencies (such as planned non-diving days)

.....

.....

.....

.....

Dive 1	Dive 2	Dive3
Start Time  Bot.Time: RF: EBT: Depth:	Surf. Int.: RG:  Bot.Time: RF: EBT: Depth:	Surf. Int.: RG:  Bot.Time: RF: EBT: Depth:

**NB. No diver is to conduct more than 3 dives per 24 hour period (approval may be granted in some circumstances), No dives are to exceed 30m, No planned decompression dives. If more than two dives a day are conducted on three consecutive days, diving should not be carried out on the fourth day.**

**University dive equipment required (if any)**

Equipment requirements (number of items) for loan must be specified below. A copy of this dive plan, signed by the Dive Officer, must then be presented to technical staff before equipment may be loaned out. A log will be kept of the ID number of each item, the borrower, date of collection, date of return, any faults or damage to the equipment and the fund against which hire costs will be charged.

Regulators     
  Buoyancy compensators     
  Tanks     
  O<sub>2</sub> Kit & cylinder

Other equipment (please specify) : .....

**Maintenance and Care of Dive Equipment in the Field (PLEASE READ CAREFULLY)**

Prior to each dive trip equipment should be assembled and examined for leaks or other signs of damage. Tank O rings should be examined for damage or contaminants.

In transit on boats or in vehicles all care must be taken to avoid accidental damage to equipment. Dive gear should be stored in such a way as to avoid damage from impacts, crushing, trampling or other abuse. Equipment should be kept clean and away from sand and other contaminants, oils, other petroleum products or harmful chemicals.

Pre dive checks (as detailed in the On Site Pre-dive Checks and Daily Risk Assessment form) should be conducted to ensure proper operation of dive equipment prior to each dive.

During use every effort should be made to keep equipment close to the divers body and avoid impacting the reef or other substrate or entanglement. Regulators should be kept clear of the sand or silt to reduce contamination or loss of gas due to leaks.

**SOUTHERN CROSS UNIVERSITY - DIVE PROPOSAL and Risk  
ASSESSMENT for SCUBA**

When a day's diving is completed, regulators should be rinsed in warm, soapy water after use (or fresh clean tap water if unavailable) with the dust caps in place and then rinsed. They should then be allowed to dry and stored in a clean, cool, dry and pest free environment out of direct sunlight.

BC's should be cleaned by rinsing in warm, soapy water after use (or fresh clean tap water) and then rinsed with fresh water. The inside of bladders should be rinsed at least twice with fresh water. They should then be allowed to dry and stored in a clean, cool, dry and pest free environment out of direct sunlight.

Tanks should be rinsed in warm, fresh clean tap water (or cold water if unavailable). They should then be stored in a clean, cool, dry and pest free environment out of direct sunlight.

All equipment should be cleaned prior to return and any faults or damage reported.

**Personal equipment** I affirm that all personal SCUBA equipment to be used has been serviced in the last 12 months or as required under AS/NZS 2299.2:2002.

**Signature**

Dive Coordinator..... Date .....

Dive team member.....Date .....

Dive team member.....Date .....

Dive team member.....Date .....

Dive team member.....Date .....

Dive team member.....Date .....

# SOUTHERN CROSS UNIVERSITY - DIVE PROPOSAL and Risk ASSESSMENT for SCUBA

## General Risk Assessment for Dive Proposal

**Risk Assessment:** Does this site have a registered emergency plan?

Yes: (Sighted by Diving Officer)..... Copy on site? Yes / No

No: Please complete the Emergency Plan on the last two pages of this form.

1. **What type of work is proposed (example; video or still photography, light salvage, etc)?**

.....  
 .....

**TASK RELATED FACTORS** – What action is required to guard against injury from equipment and infrastructure? What risks/hazards may be encountered whilst on shore prior to dive?

Task / hazard	S	P	Remedial action (severity and probability are determined on the basis remedial action specified below has been taken)
Overhead environments			
Entry and exit methods			
Vessel movements and unguarded propellers			
Entrapment hazards			
Line entanglements			
Use of basic hand tools			Are divers approved to use the tools required? Yes/No
Manual handling			
Cranes/winches/cables/rigging			
Lift bags			
Airlift or other suction*			
Hydraulic/pneumatic tools			
Availability of sufficient trained personnel (including surface support)			
<b>other risks/hazards e.g.</b>			
Traffic accidents			
Hazards whilst walking to dive site			
Slips & trips			
Cuts & scrapes			
Injury whilst sample collecting			
Other			

\* Dives are not to proceed when suction may be present from any source at the dive site (other than an approved airlift device).

## SOUTHERN CROSS UNIVERSITY - DIVE PROPOSAL and Risk ASSESSMENT for SCUBA

2. Please characterise the dive site (eg. Is this a 'Sheltered Open Water Site' as specified in section 3.3.2 of the SCUBA Diving Operations Manual or exposed off-shore site)?
- .....

**ENVIRONMENTAL FACTORS** – Complete the following table taking into account the type of dive site and prevailing conditions at the time work is proposed. A re-assessment should be conducted on site as part of the on-site risk assessment. What risks/hazards may be encountered whilst on shore prior to dive?

Factor / hazard	S	P	Remedial action
Tides or currents			
Underwater visibility			Is a shot or guide line necessary? Yes/No
Maximum water depth at the site			
Water temperature			
Time of day (night dive?)			
Underwater terrain (e.g. difficulty in navigating)			Is a guide line or surface float necessary? Yes/No
Shipping			
Isolation – remote sites			
Entrapment hazards			
Altitude			
Dangerous marine life			
Contaminants			Are dive helmets or other HAZMAT measures required? Yes/No
Site specific hazards (e.g. silt, or sharp metal on wrecks)			
Thermal exposure (sun, wind, rain and air temperature)			Advise divers to bring their own sunscreen
<b>other risks/hazards e.g.</b>			
Marine stings/bites			
Insect bites (allergic reactions)			
Cuts & scrapes			
Seasickness			Advise divers to bring their own travel sick medication
Other			

## SOUTHERN CROSS UNIVERSITY - DIVE PROPOSAL and Risk ASSESSMENT for SCUBA

**HYPERBARIC / PHYSIOLOGICAL FACTORS** – Review the hazards associated with the planned dive profile/s, breathing gases and physical activity (based on the nature of the dive site and planned work).

Hazard	S	P	Remedial action
Barotrauma descent			Are rapid or uncontrolled ascents or descents more likely? Yes/No
Barotrauma ascent			
Hypothermia / Hyperthermia			
CO poisoning			
CO <sub>2</sub> toxicity / build up			
Narcosis			
O <sub>2</sub> toxicity			
Diving profile (depth, repetitive dives, multiple ascents, multi-day dives)			
Excessive exertion			Adequate gas supply/redundancy? Yes/No
Cross infection			
Other.....			

*I/we ....., affirm that I/we have notified all personnel involved in the operation of potential hazards that exist at the dive location and task related hazards and that I/we have discussed this Risk Assessment and Emergency Plan with all involved. Once on site I/we will reassess diving conditions and complete an On Site Pre-dive Check and Daily Risk Assessment form in consultation with all divers and surface support. Diving will not be attempted unless I/we deem the area safe for the type of diving and work intended to be carried out.*

**Signature/s**

Dive Coordinator..... Date .....

Dive Coordinator..... Date .....

**Dive Proposal approved by Diving Officer** .....Date.....

Two or three person dive team approved subject to conditions as specified in 4.0 in the Southern Cross University Scuba Diving Operations Manual? Yes / No

Diving Officer.....Date.....

**Head of School/Director of NMSC**

As required by the University Safety Policy, I approve/do not approve the work described on this form.

Signature.....Date.....

**Employer's record of dive and On Site Pre-dive Checks and Daily Risk Assessment form submitted on return? Yes / No.**

## EMERGENCY PLAN FOR DIVE PROPOSAL

**An emergency plan must be completed for EACH DIVE SITE prior to diving that site for the first time. A copy of the emergency plan MUST be available on site. All divers must be familiar with the emergency plan and the location of all emergency equipment.**

**2 copies required:**

-COPY FOR DIVE TEAM

-COPY TO BE RETAINED BY DIVING OFFICER

**Dive Site:** Site name? .....

**Emergency phone number:** 000 (NB. On mobile phones – if no coverage with your provider dialling 112 will use any provider for emergencies)

**Divers Emergency Service (DES) :** 1-800-088-200 (in Australia)  
61 8 8212 9242 (International)

**Nearest phone on site (include on map if provided):** .....

.....

**Communications with dive team :**

Mobile ..... Other phone .....

Boat Radio VHF /HF /28Mhz (circle type of radio) Channels monitored? .....

Does the boat have EBIRB? Yes / No

Who is to be notified on departure or return of vessels (include radio frequencies, phone numbers and call signs)?

.....  
.....

Where is your home base while conducting diving operations?

.....

Phone number at home base? .....

**Where are the nearest hospitals to all your proposed dive site(s)? List at least two.**

Phone:	Phone:	Phone:

**Where is the nearest recompression chamber?** .....

**Nearest Diving Doctor** .....Phone .....

**Other Diving Doctor** .....Phone .....

## EMERGENCY PLAN FOR DIVE PROPOSAL

What are the directions to your dive site (s) for Emergency Services (attach a map, supply GPS coordinates if available)?

.....  
.....  
.....  
.....

Altitude at site?.....

Altitude enroute?.....

Time it will take to get assistance to the site - under worst case conditions? .....

**Evacuation procedure?**

.....  
.....  
.....  
.....

**Air evacuation?**

.....  
.....  
.....

**Is a suitable first aid kit available at the dive site? Yes/No**

**How much oxygen is required (litres) to evacuate divers from this site? .....(Litres\*)**

\* Enough oxygen must be carried to ensure that at least two patients can be given 100% oxygen during the entire evacuation procedure, from the dive location to medical facility.

**Vaccinations that may be necessary for this country/site?**

.....

**Extra medical supplies/safety equipment that may be necessary for this site?**

.....  
.....

Emergencies involving fatalities, serious injuries or serious decompression illness must be reported as soon as possible to the Occupational Health and Safety Unit and the Diving Officer. The OHS Manager's contact details are; Steve McFarlane 02 6626 9143 or 0409 601 816 (email; [steve.mcfarlane@scu.edu.au](mailto:steve.mcfarlane@scu.edu.au)). The Diving Officer's contact details are 02 6620 3251 or 0428 569 654 (email; [simon.hartley@scu.edu.au](mailto:simon.hartley@scu.edu.au)). After hours contact security on 02 6620 3333 or 02 6620 3628. Incident report forms are available at:

<http://www.scu.edu.au/admin/hr/index.php/10/#i>



## APPENDIX C – HAZARD IDENTIFICATION & RISK ASSESSMENT

Hazard identification and risk assessment should be performed at the dive proposal stage and on-site 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. It should be made clear in the dive brief and pre-dive risk assessment that **“any diver may abort the dive at any time for any reason”**.

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

- Step 1. Identify hazards and hazardous tasks (use Appendix B and C as a guide)
- 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 and complete the daily on-site risk assessment (Appendix D) by determining a risk rating as follows.

### Determining a risk rating

1. For each hazard, estimate
 

Severity	1-6
Probability	1-6
2. Use the matrix to identify the **risk rating**
3. Where higher levels of risk have been identified you need to record the control measures that are (or will be) in place in order to reduce the risk to an acceptable level. These might include further training in the use of equipment, wearing protective clothing, or vaccination

**TABLE 1: RISK RATING (see table 2 for explanation)**

		HAZARD SEVERITY					
		6	5	4	3	2	1
RISK PROBABILITY OF OCCURANCE	6	36	30	24	18	12	6
	5	30	25	20	15	10	5
	4	24	20	16	12	8	4
	3	18	15	12	9	6	3
	2	12	10	8	6	4	2
	1	6	5	4	3	2	1

A Risk Rating in the shaded area should be re-considered and further remedial actions implemented

**TABLE 2: EXPLANATION OF VALUES IN TABLE 1**

<b>Rating</b>	<b>Probability</b>	<b>Severity</b>
<b>6</b>	<b>Almost/certain:-</b> almost always occurs	<b>Extreme:-</b> multiple deaths
<b>5</b>	<b>Likely/frequent:-</b> expected, occurs repeatedly	<b>High:-</b> death
<b>4</b>	<b>Probable</b>	<b>Moderate:-</b> major injury
<b>3</b>	<b>Possible:-</b> could occur sometimes	<b>Low</b>
<b>2</b>	<b>Remote:-</b> unlikely, though conceivable	<b>Very Low</b>
<b>1</b>	<b>Improbable:-</b> so unlikely that probability is almost zero	<b>Not significant</b>

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

- Environmental conditions, for example:
  - strength and direction of wind and its potential influence on diving operations and emergency response capability,
  - atmospheric temperature and humidity,
  - sea state, including swell direction and size and more local wind generated sea conditions,
  - currents and tides,
  - time of day,
  - water temperature,
  - water depth and in particular where there is a risk of divers accidentally descending into deeper water (for example blue water or wall diving),
  - visibility and what extra equipment or procedures may be needed to dive in limited visibility,
  - underwater terrain
  - presence of other vessels at the dive site, such as around ports or in channels,
  - entrapment hazards including such things as tree branches, underwater vegetation, debris and the metal hulls of ship wrecks,
  - dangerous marine life
  - contaminants,
  - isolation of the site, etc
- Task factors, taking into account complexity and the fact that non-routine tasks may increase the level of risk (all divers should be familiar and experienced with the proposed work). Other examples include;

- working in overhead environments, considerable additional training, experience, equipment (twin tanks, guide lines, lighting, etc) and specific approval from the Diving Officer, would be required in wrecks, caves and other overhead environments,
- entry and exit methods, how divers will avoid injury while entering or leaving the water (for example on rocking boats or through waves on a shore entry),
- vessel movements and unguarded propellers and the procedures required to ensure divers are not injured by support vessel movements at the dive site,
- entrapment hazards with anchor ropes and other lines and equipment on site, including any guide lines or safety lines used by divers,
- tool, all divers need to be qualified and experienced in the use of any tools they will be required to use on site (these include basic hand tools like hammers, adjustable spanners, hack saws, etc, as well as lift bags, air lifts, hydraulic and pneumatic tools),
- cranes, winches and other rigging on the work site and associated risks,
- availability of sufficient personnel above and below the water to facilitate the work (including having enough assistance to assist divers in and out of the water, lift and move heavy equipment and maintain an effective surface watch), etc,
- Factors relating to associated activities, for example manual handling (such as lifting heavy dive gear, hauling ropes and assisting divers with equipment they need during a dive), boat handling, and dive platforms, etc. Consideration should also be given to the safe and secure storage of dive gear and other equipment in transit and at the work site (to avoid injury from falling or moving equipment or tripping over equipment in a cluttered boat or work site).
- Hyperbaric/Physiological factors, examples include,
  - depth and duration of dive and how this affects such factors as the risk of narcosis, breathing resistance and CO<sub>2</sub> build up during working dives, excessive gas consumption and decompression,
  - frequency of diving, multiple ascents, repetitive diving, multi-day diving and how divers will ascend from a dive (safety stops and other measures),
  - breathing gas, how the quality of breathing gas available to divers can be assured, and factors relating to breathing mixtures other than air (such as O<sub>2</sub> toxicity),
  - exertion required to reach site and conduct tasks,
  - immediate pre-dive fitness (including ensuring divers are well rested, well hydrated, can equalise, free from illness, have not indulged in alcohol prior to the dive, etc)
  - altitude exposure,
  - risk of cross infection,
  - risk of barotraumas, identifying any factors relating to the proposed diving operation (example, use of lift bags) that might potentially put divers at risk of various types of barotraumas,
  - excessive noise at the dive site, etc
- Emergency response factors, for example location and availability of emergency facilities and systems, availability of phones and/or other means to call for

assistance, availability of first aid and oxygen kits on site, a clear emergency response plan, etc

- Other hazards that could be encountered during the diving operations, for example, water inlets, shipping, use of hazardous substances, biological pollutants or explosives, etc.

Hazard identification and risk assessments should be documented using the forms in Appendix 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 ie;

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 minimise 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 organisation and planning of the dive and selection of appropriate means of communication to minimise risk; the dive plan should minimise the duration and degree of each diver's exposure to risk, and
6. Personal Protective Equipment – appropriately designed and sized equipment provided, used and maintained and the limitations of the equipment understood in order to minimise 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 D - ON SITE PRE-DIVE CHECK & RISK  
ASSESSMENT FORM**

## SCU - ON SITE PRE-DIVE CHECKS AND RISK ASSESSMENT (page 1 of 2)

**TO BE COMPLETED BEFORE EACH DAYS DIVING AT A SITE IN CONSULTATION WITH ALL DIVE TEAM MEMBERS AND SURFACE SUPPORT AND RETURNED TO THE DIVING OFFICER**

Location: \_\_\_\_\_

Date: \_\_\_\_\_

Time: \_\_\_\_\_

**ENVIRONMENTAL FACTORS** – Determine severity and probability of injury on the 6 point scale outlined in the SCU Diving Operations Manual (product must be less than 10 for diving to proceed)?

Factor / hazard	S	P	Remedial action (severity and probability are determined on the basis remedial action specified below has been taken – Include details in pre-dive safety brief)
Wind strength and direction			
Sea state			
Tides or currents			
Underwater visibility			Is a shot or guide line necessary? Yes/No
Maximum depth			
Water temperature			
Time of day (night dive?)			
Underwater terrain (eg. difficulty in navigating)			Is a guide line or surface float necessary? Yes/No
Shipping			
Isolation – remote sites			
Entrapment hazards			
Dangerous marine life			
Contaminants			Are dive helmets or other HAZMAT measures required? Yes/No
Site specific hazards (eg. silt, or sharp metal on wrecks)			Are all divers familiar with the Dive Site Emergency Plan? Yes/No
Thermal exposure (sun, wind, rain and air temperature)			
Other.....			

**TASK RELATED FACTORS** – What action is required to guard against injury from equipment and infrastructure?

Task / hazard	S	P	Remedial action
Entry/exit methods			
Shot line or guide lines			
Vessel movements and unguarded propellers			
Use of hand tools			Are divers approved to use the tools required? Yes/No
Cranes/winches/cables/rigging			
Lift bags			
Airlift or other suction*			
Search patterns			
Manual handling			
Other.....			

\* Dives are not to proceed when suction may be present from any source at the dive site (other than approved airlift devices).

**PLEASE TURN OVER**

**HYPERBARIC / PHYSIOLOGICAL FACTORS** – Review the hazard associated with factors, for planned dives.

Hazard	S	P	Remedial action
Barotrauma descent			Are rapid or uncontrolled ascents or descents more likely? Yes/No
Barotrauma ascent			
Hypothermia			
Hyperthermia			
CO poisoning			
CO <sub>2</sub> toxicity / build up			
Narcosis			
O <sub>2</sub> toxicity			
Diving profile (depth, repetitive dives, multiple ascents, multi-day dives)			Additional risk factors for decompression sickness? Yes/No
Excessive exertion			Adequate gas supply/redundancy? Yes/No
Cross infection			
Other (specify).....			

**PRE-DIVE CHECKS** – Tick when completed by each diver prior to each dive (columns represent dives 1-3).

- |                          |                          |                          |  |
|--------------------------|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>Are all divers fit to dive?</b> – Check for appropriate diving experience and skill level, appropriate fitness level, prior physical exertion (fatigue), recent illness, dehydration, sleep deprivation, alcohol or drug imbibed. <i>It is the divers responsibility to report any condition that may affect their diving performance or safety.</i>  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>Review dive plan</b> - depth, duration, direction, site orientation, turn pressure, rock bottom (minimum air supply required to take two divers to the surface from depth), deco (ascent profile), each divers role, the order in which underwater operations will be performed and contingency plans (including method of diver recall, dealing with buddy separation, separation from the support vessel and other potential problems). <i>The Dive Leader must ensure all divers are familiar with and comfortable with the proposed dive plan. Make it clear "Any team member may abort the dive at any time for any reason".</i> |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>Is the divers main air switched fully on?</b> – Confirm each divers main gas supply is switched on and there is adequate supply for the proposed dive (record on on-site log sheet) before divers kit up. <i>The practice of turning a valve half a turn off may result in a false out of air when divers descend to depth and is discourages.</i>  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>Review divers equipment</b> – Dive Leader locates and calls out each piece of equipment he/she is carrying (including basic SCUBA equipment) and its status (working properly?), other team members locate each item and report on the status and then list additional equipment carried. <i>The Dive Leader must ensure that every team member has the minimum equipment detailed under section 4.3 of the SCU Diving Manual. Can every team member locate their weight belt release, knife and inflate their BCD? Yes / No</i>  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>Perform modified S-Drill</b> - the regulator each diver plans to donate in an out of air emergency should be deployed to ensure this regulator is free from obstruction, to develop muscle memory and also so the other team members are aware of how an OOA will be dealt with. <i>Scientific divers often carry a great deal of equipment, placement of this equipment should not compromise effective air sharing or interfere with the divers ability to drop a weight belt or access other important equipment (such as the power inflator or dump valve on a BC).</i>   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>Can all divers equalise?</b> – Confirm each diver can equalise and is comfortable with the proposed dive before entering the water. <i>It is the divers responsibility to report any concerns regarding a proposed dive.</i>  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>Perform bubble check</b> - in water, including all SCUBA and buoyancy devices and pressure vessels (such as camera housings). <i>Dives should not proceed if O rings or hoses show signs of damage or failure.</i>  |

**SIGNATURES**

**Dive Coordinator:** .....(signature).....

**Dive Leader:** .....(signature).....

**Diver (1):** .....(signature).....

**Diver (2 or attendant):** .....(signature).....

## **APPENDIX E - EMPLOYER'S RECORD OF DIVE SHEET**

*Each dive team must complete the following log sheet for each days diving conducted for educational or research purposes with SCU. This log sheet would normally be completed by the diver's attendant in consultation with divers and the Dive Coordinator. The log sheet must be submitted to the Diving Officer by the Dive Coordinator (or delegate) immediately after the trip.*



**SOUTHERN CROSS UNIVERSITY – EMPLOYER’S RECORD OF DIVE** RETURN TO THE DIVING OFFICER ON COMPLETION OF TRIP

Dive Coordinator: \_\_\_\_\_ (signed) \_\_\_\_\_ Date: \_\_\_\_\_ Medical O<sub>2</sub>: \_\_\_\_\_ (bar/psi)

Location:  
 DIVE ONE: \_\_\_\_\_ DIVE TWO: \_\_\_\_\_ DIVE THREE: \_\_\_\_\_

Purpose (nature of work):  
 DIVE ONE: \_\_\_\_\_ DIVE TWO: \_\_\_\_\_ DIVE THREE: \_\_\_\_\_

Divers name (indicate if Dive Leader –“DL”)		Start pressure (bar)	End pressure (bar)	Surface interval (min)	Repetitive factor - DCIEM	Maximum depth (m)	Bottom time* (min)	EBT - DCIEM	Total DT (min)	End group - DCIEM	Signature
Time diver left surface (24hr time)											
D I V E  O N E	Left surface:										
	Left surface:										
	Left surface:										
D I V E  T W O	Left surface:										
	Left surface:										
	Left surface:										
D I V E  T H R E E	Left surface:										
	Left surface:										
	Left surface:										

\* Bottom time is from leaving the surface to beginning of ascent (but does not include stops or ascent time).

## **APPENDIX F - PERSONAL LOGBOOK**

*Individuals must submit a separate log only if their dive profile is different from the rest of the team. Log entries are to be submitted to the Diving Officer as soon as is practical. The following template is provided for this purpose or for use as a personal record of diving service.*

<b>Name of person completing log</b> .....		<b>Role of person completing log in the dive team</b>	
Dive No:	<b>Location</b> (include GPS coords if available):	<input type="checkbox"/> Dive Coordinator <input type="checkbox"/> Dive Leader <input type="checkbox"/> Diver <input type="checkbox"/> Other .....	
Repetitive ... of ...			
Date:	<b>Other team members:</b>		
<b>Dive Time:</b> Bottom time: Stops: Total DT:	<b>Equipment used / tasks performed / comments</b> Report maintenance/repairs required of SCU SCUBA equipment, injuries, incidents, or potential hazards that should be considered by future divers at this site to the Dive Officer.		
<b>Depth</b> Max Average Rep. Group (at end of this dive)	<b>For repetitive dives</b> Repetitive group (at end of previous dive – DCIEM table A): .....		<b>Dive conditions</b> Currents: Visibility: Water °C: Surface conditions:
<b>Tables/computer used</b> (DCIEM tables recommended):			
<b>Signatures</b>	Dive coordinator	Dive Leader	Buddy

<b>Name of person completing log</b> .....		<b>Role of person completing log in the dive team</b>	
Dive No:	<b>Location</b> (include GPS coordinates if available):	<input type="checkbox"/> Dive Coordinator <input type="checkbox"/> Dive Leader <input type="checkbox"/> Diver <input type="checkbox"/> Other .....	
Repetitive ... of ...			
Date:	<b>Other team members:</b>		
<b>Dive Time:</b> Bottom time: Stops: Total DT:	<b>Equipment used / tasks performed / comments</b> Report maintenance/repairs required of SCU SCUBA equipment, injuries, incidents, or potential hazards that should be considered by future divers at this site to the Dive Officer.		
<b>Depth</b> Max Average Rep. Group (at end of this dive)	<b>For repetitive dives</b> Repetitive group (at end of previous dive – DCIEM table A): .....		<b>Dive conditions</b> Currents: Visibility: Water °C: Surface conditions:
<b>Tables/computer used</b> (DCIEM tables recommended):			
<b>Signatures</b>	Dive coordinator	Dive Leader	Buddy

<b>Name of person completing log</b> .....		<b>Role of person completing log in the dive team</b>	
Dive No:	<b>Location</b> (include GPS coords if available):		<input type="checkbox"/> Dive Coordinator <input type="checkbox"/> Dive Leader <input type="checkbox"/> Diver <input type="checkbox"/> Other .....
Repetitive ... of ...			
Date:	<b>Other team members:</b>		
<b>Dive Time:</b> Bottom time: Stops: Total DT:	<b>Equipment used / tasks performed / comments</b> Report maintenance/repairs required of SCU SCUBA equipment, injuries, incidents, or potential hazards that should be considered by future divers at this site to the Dive Officer.		
<b>Depth</b> Max Average			<b>Dive conditions</b> Currents: Visibility: Water °C: Surface conditions:
Rep. Group (at end of this dive)	<b>For repetitive dives</b> Repetitive group (at end of previous dive – DCIEM table A): .....	Surface interval (since prev. dive – DCIEM Table B): ... : ... Repetitive factor/RNT: .....	
<b>Tables/computer used</b> (DCIEM tables recommended):			
<b>Signatures</b>	Dive coordinator	Dive Leader	Buddy

<b>Name of person completing log</b> .....		<b>Role of person completing log in the dive team</b>	
Dive No:	<b>Location</b> (include GPS coordinates if available):		<input type="checkbox"/> Dive Coordinator <input type="checkbox"/> Dive Leader <input type="checkbox"/> Diver <input type="checkbox"/> Other .....
Repetitive ... of ...			
Date:	<b>Other team members:</b>		
<b>Dive Time:</b> Bottom time: Stops: Total DT:	<b>Equipment used / tasks performed / comments</b> Report maintenance/repairs required of SCU SCUBA equipment, injuries, incidents, or potential hazards that should be considered by future divers at this site to the Dive Officer.		
<b>Depth</b> Max Average			<b>Dive conditions</b> Currents: Visibility: Water °C: Surface conditions:
Rep. Group (at end of this dive)	<b>For repetitive dives</b> Repetitive group (at end of previous dive – DCIEM table A): .....	Surface interval (since prev. dive – DCIEM Table B): ... : ... Repetitive factor/RNT: .....	
<b>Tables/computer used</b> (DCIEM tables recommended):			
<b>Signatures</b>	Dive coordinator	Dive Leader	Buddy

# APPENDIX G – COMMUNICATION METHODS

Effective and efficient communication is vital for the safe conduct of underwater operations. Efficient communication also saves time and helps facilitate the completion of work in a timely manner (important when time spent in the field is at a premium). In order to communicate effectively all divers must be familiar with commonly used hand signals and any signals or communication techniques specific to a diving operation (these should also be revised and agreed upon immediately prior to the dive).

The following guidelines are provided for underwater communication using hand signals, life lines, underwater lights and audio communications. Where SCU divers are required to use communication methods other than commonly accepted recreational diving hand signals, divers should be appropriately trained in their use, the Diving Officer should approve their use and the following commonly accepted guidelines should be employed. **Divers wishing to use signals other than those laid out below they must obtain approval from the Diving Officer.**

## General Hand Signals

All divers should familiarise themselves with the hand signals most commonly required for SCUBA diving.



Distress/help



Buddy breathe/share air



Stop/hold it/stay there



OK/OK?



Danger



OK?/OK  
(on surface at distance)



Go up/going up



Out of air/danger



Something is wrong



OK?/OK  
(one hand occupied)



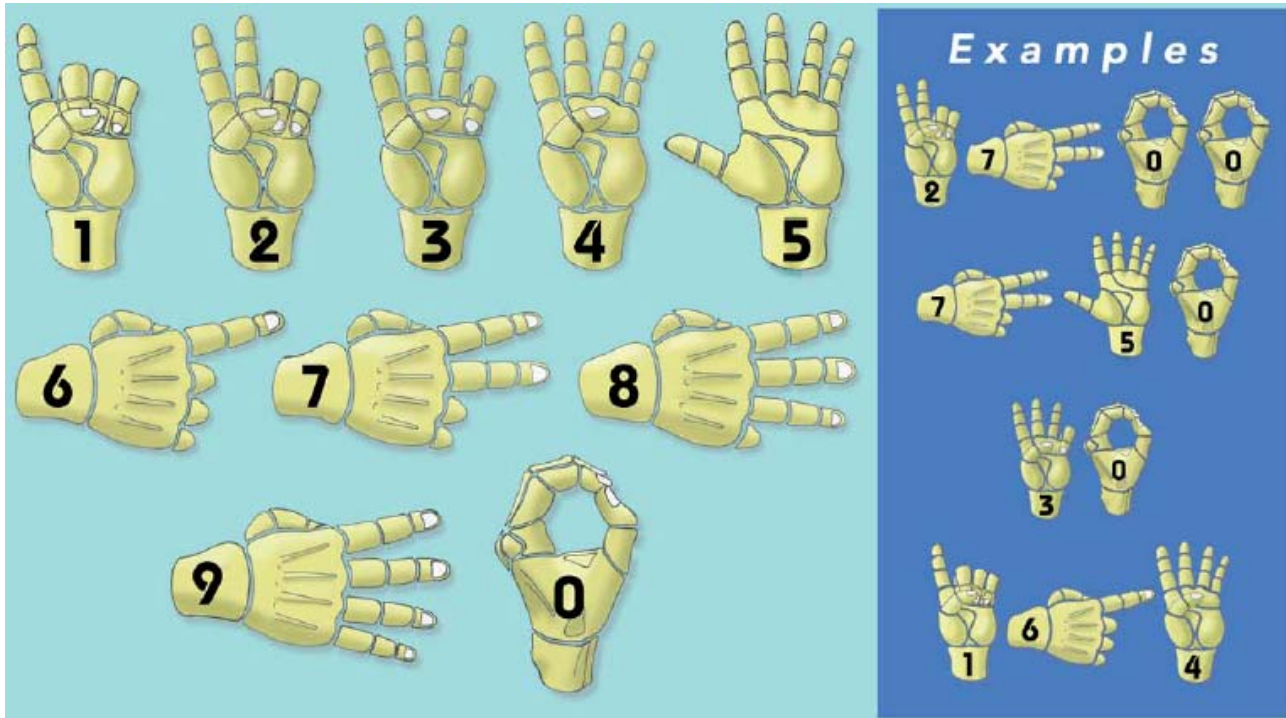
Go down/going down

Further guidance may be obtained from the Recreational Scuba Training Council document titled "Common Hand Signals for Recreational SCUBA Diving" available from the following web site...

<http://www.wrstc.com/downloads/CommonHandSignalsforScubaDiving.pdf>

## 'One Hand Numbering' Hand Signals

Decompression time, depth and cylinder pressure are all examples of underwater communications that require numbers. In situations where a diver only has one hand available for some reason, familiarity with the 'one-hand' numbering system shown below can be invaluable.



## Lifeline Signals

In situations where SCUBA divers are required to operate with lifelines tethering them to the boat, attended by a surface Diver's Attendant, those Divers and the Dive Attendant must be familiar with standard lifeline signals – see below. These signals have been mainly developed for use by commercial divers, and can be complex and difficult to use. If using this system for communication, divers and attendants should attempt to keep signals as simple as possible, so they can be understood even in a stressful situation. Signals should be reviewed prior to the dive. Line signals may be given either by a Diver's Attendant to a Diver, via a lifeline, or diver-to-diver with a buddy line.

Line signals comprise either pulls or bells or a combination of both. A pull is a steady movement of the line, of at least 0.5 metres - always given singly. **All signals are preceded by one pull to attract attention.** A bell is a sharp quick tug, always given in pairs where possible, e.g. five bells is given as:

1 pull to get the attention of the Dive Attendant/buddy; then 2 quick tugs (pause), 2 quick tugs (pause), 1 quick tug

It should be noted that one bell does not exist as a signal on its own.

All signals received must be acknowledged by repeating the signal back to the sender, but not unless the signal is clearly understood. If a signal is not acknowledged or is acknowledged incorrectly, the person making the signal should go on repeating the signal until a correct acknowledgement is received. **It is generally good practice in all forms of underwater communication (hand, light, line, oral, etc) to repeat a signal back to the sender.**

Divers using a surface float to signal do so by pulling on the float line and causing the float to bob up and down. To acknowledge or send signals the Diver's attendant needs to approach and take the float line in hand. Care must be taken not to put undue strain on the line as the vessel drifts in the wind or current.

### Signals - Attendant to Diver

- |                                |  |
|--------------------------------|--|
| a) 1 pull                      | To call attention. Are you OK?                             |
| b) 2 pulls                     | Am sending down a rope's end (or as previously arranged).  |
| c) 3 pulls                     | You have come up too far. Go down slowly till we stop you. |
| d) 4 pulls                     | Come up.   |
| e) 4 pulls followed by 2 bells | Come up / hurry up. Come up, surface decompression.        |
| f) 4 pulls followed by 5 bells | Come up via your surface float.                            |

### Direction Signals

- |            |   |
|------------|---|
| a) 1 pull  | Search where you are.                                 |
| b) 2 bells | Go to the end of distance line / jackstay / lifeline. |
| c) 3 bells | Face shot lifeline then go right.                     |
| d) 4 bells | Face shot lifeline then go left.                      |
| e) 5 bells | Come in to your shot, or turn back if on a jackstay.  |

### Signals - Diver to Attendant

- |                                |  |
|--------------------------------|--|
| a) 1 pull                      | To call attention / Made bottom / Left bottom / Reached end of jackstay / I am OK.                             |
| b) 2 pulls                     | Send me down a rope's end (or as previously arranged).   |
| c) 3 pulls                     | I am going down again.   |
| d) 4 pulls                     | May I come up?   |
| e) 4 pulls followed by 2 bells | Assist me up / I want to come up.  |
| f) 4 pulls followed by 5 bells | May I come up my surface float?  |
| g) Succession of pulls (>4)    | EMERGENCY SIGNAL (ONLY to be used in extreme emergency). Need not be answered, but must be obeyed IMMEDIATELY. |

- |                          |   |
|--------------------------|---|
| h) Succession of 2 bells | Am fouled and need the assistance of another diver. |
| i) Succession of 3 bells | Am fouled but can clear myself if left alone.       |

#### Working Signals

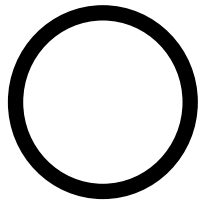
- |            |   |
|------------|---|
| a) 1 pull  | Hold on / stop.   |
| b) 2 bells | Pull up.  |
| c) 3 bells | Lower.  |
| d) 4 bells | Take up slack lifeline or you are holding me too tight. |
| e) 5 bells | Have found, started, or completed work.                 |

### Underwater lights

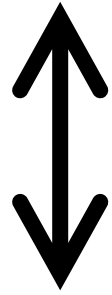
A powerful torch is mandatory for night diving, and useful for low visibility or general open water diving to facilitate effective team cohesion and rapid communication. General guidelines for using underwater torches include:

- Once the torch is switched on leave it on till the end of the dive, when you're back on the boat/shore. Most bulb failures occur when the torch is first switched on. Operating switches underwater can also result in leakage. If you need to get rid of the light to search for a team members light or for other reasons, hold the torch against your body.
- Never shine a torch in any ones eyes (or the eyes of turtles or other marine life), attract attention by moving beam back and forward across the bottom within another divers field of vision then avert the beam when they look toward you.
- Shine torch on hands so buddy can see your hand signals.
- Torch signals. Different agencies recommend different approaches to signalling. The method of signalling should be agreed upon prior to entering the water however the following method is suggested. Circling the torch beam in a divers field of vision equates to "OK", this signal should be returned. A slow steady side to side or up and down motion in a diver field of vision indicates ATTENTION. A rapid motion means DISTRESS (or I need URGENT ATTENTION), most likely an out of air emergency so on seeing this signal a diver should start swimming toward the distressed diver and prepare to share air. Generally any rapid torch movement should be taken as a sign of distress. In most circumstances head mounted torches should not be used as movements of the divers head may be mistaken for distress signals.
- Use deliberate side to side motions with the torch as you swim along, avoid rapid movements as these may be interpreted as distress. Periodically pass your torch beam through the field of vision of other team members so they can reference your position. Adopt effective team positioning so each team member can easily reference the position of other team members. Divers should generally use torches of similar strength. The team member with the weakest light (or a diver who has been forced to switch to a backup) should generally be placed in the lead.





**OK**



**Attention (rapid for  
distress)**

### **Voice Communication (“comms”)**

There are a range of different voice communication systems (“comms”) available, but it should be noted that all voice communications equipment used for scientific diving must meet the standards described in the Australian Standards for Occupational Diving AS2299.1 & AS2299.2. Divers planning on using underwater voice communications, or monitoring diver communications as surface support, should be appropriately trained in voice communications.

It is particularly important where divers are intending to use, or are required to use, voice communication systems, that they be fully conversant with the particular equipment to be used prior to attempting any dive. Familiarisation with equipment is especially important where full face masks are being used. In such a case, consideration should be given to performing a familiarisation dive, or dives, in sheltered waters prior to undertaking field operations.

On any dive where use of a voice communication system has been made conditional on the dive taking place, the dive must not take place without a backup communications system being employed (e.g.. a lifeline system), and all personnel involved in the operation being familiar with its use. The following general guidelines are based on commercial diver training material provided by the New Zealand School of Outdoor Studies School of Commercial Diver Training.

#### **General introduction**

Talking and listening to instructions while diving requires a lot of effort and interferes with breathing and work. All conversations between surface support and the diver should be kept to a minimum and conducted in a concise and formal manner, to avoid mistakes and ensure the line is open for urgent communications. However, the diver must keep the surface informed about their location and the progress of the work. In general the following activities should be reported by the diver as a matter of routine:

- Leaving the surface
- Diver reaches the bottom
- Diver commencing work (or a particular task)
- Start ascent
- Stop ascent

In addition, surface support should periodically prompt divers to check their gas supply. Any problems a diver encounters should also be immediately reported. If a

diver is not reporting regularly on progress, surface support should ask questions to make sure they are kept up to date on progress and can assist with any problems encountered.

Permanent attention should be given to the divers breathing rate. Breathing rate is the best method available for monitoring a divers workload and stress level during a dive. The following table provides a general guide as to a divers status based on breathing rate. However, consideration should be given to individual variation. Surface support should also be aware of the effect of depth on a divers respiration and gas consumption.

Number of breaths per minute	Indicative of
30 or more	Very hard work. Serious danger of getting out of breath. The diver must be ordered to stop and the tender/standby diver told to get ready to assist.
25 to 30	Hard work. The diver should be advised to take it easy.
20 to 25	Normal work.
15 to 20	Light or no work.
Less than 15	No activity at all. It would be advisable to check the status of the diver.

The higher a divers breathing rate the less likely they will be to answer or listen to you. Advise the diver to take it easy, stop and rest for a while before delivering the message. Always speak with a calm, quiet and deliberate voice at all times (if there is a problem this will help to calm the diver). Shouting makes things worse as does hurrying.

### Procedural recommendations

As with other forms of radio communication (volunteer marine rescue, air traffic control, etc) it is best to keep the range of messages to be passed quite narrow and adhere to a rigorous procedure for sending message. This includes the specific words and phrases that may be used and the format of messages. This approach greatly improves communication efficiency and reduces confusion.

When to talk?: Surface support should be aware that they will need to wait for a pause in the divers breathing before they call them. Don't talk while the diver is inhaling or exhaling. The diver may then need a couple of breaths before they can acknowledge the call. The subsequent conversation will be slowed by the need to fit speech around the divers breathing and associated noise. Also be aware boat and engine noise and the noise from any tools used by the diver will affect communication.

Often it is advisable to agree that only one diver will do all the talking and that the other diver/s will remain passive unless there is a specific need for them to talk (such as a problem). If divers talk simultaneously there will be 100% communication loss, it may also be unclear which diver is talking.

If possible arrange diving tasks so as to avoid long periods of continuous talking to the diver. However, during any long pause in communication, make communication checks every few minutes to ensure all is going well. **Divers may become uncommunicative if there is a problem so a check may prompt them to alert you to a problem they are encountering. Pay attention to a divers breathing at all times.**

What to say?: The design of most masks affects a divers speech, often quite badly. The underwater environment is also quite noisy and underwater speakers are often difficult to hear. Coupled with the divers breathing and other confounding factors, effective underwater voice communication can be challenging. Some general guideline for improving the effectiveness and efficiency of underwater communications include:

1. The surface support should control communications.
2. Think carefully about the message you intend to send and how it will be phrased.
3. **Call up and wait for an acknowledgement before giving a message (“Diver one this is surface”, response should be “Surface this is diver one”).**
4. **Precede ALL messages with who the message is intended for and who is sending the message (“Diver one this is surface...”).**
5. Use words of 3 or 4 syllables (these are more easily understood than 1 or 2 syllable words).
6. Break long messages up into three to five second sections, matched to the divers breathing.
7. Phrase messages so the recipient can answer as simply as possible.
8. There is usually a range of names for tools or other aspects of a divers work. Use the same name constantly to avoid confusion and agree on these names in the pre-dive briefing if necessary. Where there are a number of different names it is best to choose the most intelligible name for an item.
9. If it is not important, don't say it. Talking and listening takes time and effort so keep each message as short and simple as possible.
10. **Insist on a verbatim acknowledgement for every message (this allows the sender to check that the message was correctly received). Use the same words when repeating/acknowledging a message.** If a message was not understood use the term “Say again” to request a repeat (having three syllables this phrase is generally recommended). If a message is not received correctly the sender should repeat the message until it is correctly acknowledged. Observation and theory suggest that repeating a message verbatim is the best approach, however if this is unsuccessful after one or two attempts the message should be rephrased (but with a warning that the message is being repeated in a different way – “Rephrasing message...”).
11. Help the diver stay calm and don't antagonise them whatever the provocation.

The phrase “Roger” shall not be used to acknowledge messages (only in place of “yes”). This word is often misused and this misuse has resulted in confusion and serious accidents in the past. For example, in a fatal accident in the North Sea an order was given from the surface that divers would need to leave the bell, meaning at some future time. Instead the order was taken as an order for immediate action. Gas supply was being changed and a diver left the bell and died. **All messages must be preceded by the person the message is intended for and who is sending the message and all messages should be repeated verbatim to ensure the message has been received correctly.**

The words and phrases used for under water voice communication should be standardised as much as possible. A number of standard words and phrases are

provided in the following table, however dive teams will likely develop their own approach based on experience and the work at hand.

Expression	Meaning
“Roger on that”	“Yes” – Don’t use “Roger on that” on its own to reply to a message. “Roger” on its own does not show that a message has been correctly understood.
“Negative on that”	“No”
“Say again”	“I don’t understand” or “Please repeat” – If unsure that a message has been heard correctly either use “say again” or “was that... [followed by the message]”.
“Repeating”	Used when a message is being repeated verbatim (using the same words). If it is obvious that the message is not getting through, say “rephrasing message” and say the message in a different way.
“Rephrasing message”	“The message is not getting through so I’m going to rephrase and try again”
“Was that...[followed by the message]?”	Use to check if a message was correctly heard.
“Cancel the last”	“Disregard the previous message” or changing/switching subject.
“Left surface”	
“On bottom”	
“Left bottom”	
“Slack to diver”	
“Up on the divers slack”	
A scream (or “help, I am in trouble”)	Urgent assistance needed. Get the message across however necessary and don’t remain silent even when out of gas.

The difficulties associate with underwater voice communications mean that individual letter often need to be used to spell out words that prove difficult to communicate or for other reasons. Letters usually have one syllable and are often difficult to communicate. The phonetic alphabet utilises unique words for each letter, with generally two syllables. The following table summarises the NATO phonetic alphabet.

A - Alpha	K – Kilo	U - Uniform	0 - Zero
B - Bravo	L – Lima	V - Victor	1 – Wun (one)
C - Charlie	M – Mike	W - Whiskey	2 - Two
D - Delta	N – November	X – X-ray	3 – Tree (three)
E - Echo	O - Oscar	Y - Yankee	4 – Fower (four)

F - Foxtrot	P - Papa	Z - Zulu	5 - Five
G - Golf	Q - Quebec		6 - Six
H - Hotel	R - Romeo	. – decimal (point)	7 - Seven
I - India	S - Sierra	. – Full (stop)	8 – Ait (eight)
J - Juliet	T - Tango		9 – Niner (nine)

## APPENDIX H - DECOMPRESSION PROCEDURES

### Reduced Bottom Time Limits For Remote Locations

Maximum depth of dive (m)	Maximum bottom time (mins)		
	COLUMN A Chamber within 2 hours	COLUMN B Chamber within 2 – 6 hrs	COLUMN C Chamber over 6 hours
3	No limit	240 (400)	190
6	240 (400)	240 (300)	190
9	180	140	110
12	120	70	55
15	75	60	50
18	50	40	30
21	35	30	20
24	25	20	15
27	20	15	10
30	15	10	10

### Amendments to DCIEM procedures

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

## **APPENDIX I - NITROX DIVING (INFORMATIVE)**

Nitrox is a combination of oxygen and nitrogen where the percentage of oxygen is increased from standard air, which is approximately 21% oxygen and 79% nitrogen. Common Nitrox mixtures used in depths less than 30 metres include 32% and 36% (not recommended) oxygen. **NO OTHER BREATHING MIXTURES ARE PERMITTED ON SITE UNLESS APPROVED BY THE DIVING OFFICER** (Triox 30/30 may be used by suitably qualified divers; therapeutic oxygen will be clearly marked and available for surface use).

Nitrox divers have less nitrogen in their tanks than air divers. For an equivalent dive they absorb less nitrogen into their bodies, off gas more efficiently and may be less exposed to Decompression Sickness (DCS). Using Standard Air Dive Tables on Nitrox may increase physiological safety, especially when divers are more at risk from DCS. Risk factors may include: more aggressive dive profiles, obesity, illness or injury, older age, fatigue and heavy exertion during or after a dive.

Diving cylinders used for Nitrox are labelled as to their content and maximum safe operating depth during filling. Usually the cylinders are also clearly marked with a green band and the words Nitrox or Enriched Air Nitrox. **DIVERS MUST NEVER USE A CYLINDER UNLESS THEY ARE CERTAIN OF THE CYLINDERS CONTENT AND MAXIMUM SAFE OPERATING DEPTH.** This sort of mistake can lead to a diver exposing themselves to the risk of central nervous system (CNS) oxygen toxicity, resulting in convulsion underwater and death by drowning. Divers who plan to utilise Nitrox must be trained in the rescue of a toxing diver underwater and in determining appropriate limits for oxygen exposure.

Regulators suitable for use with less than 39% oxygen can be used for air or Nitrox diving. Divers must check their own Nitrox fills with an oxygen analyzer and sign off on the fill log at the fill facility. Cylinders are tagged or labelled describing fill pressure, oxygen content, analysis date, maximum operating depth, name of tester and cylinder number. Cylinders should be retested immediately prior to diving and any tags or labels removed for safe disposal. A cylinder that is unused must be emptied or tested and relabelled immediately.

A standard Nitrox course will equip a diver with the understanding and training to use gas mixes other than air to increase safety margins, while working to air dive tables.

## APPENDIX J – MINIMUM DELAY BEFORE EXPOSURE TO ALTITUDE

Minimum Delay before Exposure to Altitude (extract from Uni of Sydney Diving manual)

ALTITUDE (METERS)	TIME AFTER LAST DIVE (HOURS)		
	Category of dive (see legend)		
	Category 1	Category 2	Category 3
0 – 150	Nil	Nil	2
150 - 300	Nil	2	4
300 - 600	2	12	24
600 – 2400 (Note 1)	12	24	48
> 2400	24	48	72

### LEGEND:

Category 1 = Single dive to  $\leq 50\%$  of no-decompression limits, with no decompression or repetitive dives in previous few days.

Category 2 = Routine no-decompression diving; Single decompression dives.

Category 3 = Multiple decompression dives;

Extreme exposure;

Omitted decompression;

Other adverse events.

### NOTES:

1) Routine air travel – In pressurized aircraft, the altitude referred to is the effective altitude within the cabin. Commercial aircraft are usually pressurized to an effective cabin pressure of 2400 meters or less.

2) The recommendations are for routine diving operations. The risk of decompression illness varies substantially with differing dive profiles, and data regarding the risks associated with altitude exposure after diving is limited. The advice of a medical practitioner appropriately trained in underwater medicine is recommended where altitude exposure after diving is required.

**(AS/NZS2299.2:1999)**



## **APPENDIX K – INCIDENT & ACCIDENT REPORT**

**Procedures:**

**Injury or Work-related Illness**

1. Injured employee / person to complete form
2. Form to be forwarded to Supervisor for comment
3. Supervisor to forward form to HR Manager (Workplace Health & Safety), HR Services or fax (02) 6622 4240 within 48hours of incident
4. OH&S Manager to forward to Head of School / Work Unit if further action is required

**Hazard or Near-Miss**

1. Employee / person discovering hazard to complete form
2. Form to be forwarded to Supervisor for comment
3. Form to be forwarded to HR Manager (Workplace Health & Safety), HR Services or fax (02) 6622 4240 immediately

Full details are available at: <http://www.scu.edu.au/admin/hr/procedures/index.php/90/>

**Type of Incident:**

- Hazard
  Injury
  Near-miss
  Work-related illness

**Details of Incident / Injury / Work-related Illness / Hazard: (eg How did it happen?)**

Date: ..... Time: ..... Location: .....

.....

.....

.....

.....

**All following details are to be completed if reporting an INJURY or WORK-RELATED ILLNESS only.**

**Applicant's Name:** ..... **Date of Birth:** .....

**Residential Address:** .....  Female  Male

..... **Home Phone:** .....

**Association with SCU:**

- Staff
  Student
  Contractor
  Other: .....

**If Staff, complete following details:**

**Position:** .....  Full-time  Part-time  Casual

**Work Unit:** ..... **Contact Number:** .....

**Cause of Injury / Illness / Hazard:**

- Biological
  Bodily stress
  Car accident
  Chemical
  Electrical
- Fall, trip, slip
  Heat radiation
  Psychological
  Sound & pressure
  Struck by object
- Other *[please specify]*: .....

**Nature of Injury or Illness:** .....  
(eg. fracture, sprain, etc)

**Body Location of Injury:** .....  
(eg. right arm, neck, left leg, etc)

**Medical Treatment Received To Date:** .....  
(eg. nil, first aid, doctor, hospital, etc)

**Signature:** ..... **Date:** .....

**First Aid Officers ONLY:** Minor injuries (eg bruising, grazes, paper cuts) **DO NOT** require Page 2 of this form to be completed.

**Details of Witnesses:**

No witnesses

Name: ..... Contact Phone: .....

Name: ..... Contact Phone: .....

**Supervisor's comments and details of actions taken to prevent future incidents:**

.....  
.....  
.....  
.....

Name: ..... Signed: ..... Date: .....

**Head of Work Unit's Comments (if required):**

.....  
.....  
.....  
.....

Signed: ..... Date: .....

**HR Manager (Workplace Health & Safety) Comment:**

.....  
.....  
.....  
.....

Signed: ..... Date: .....

**Checklist:**

- |  |                              |                             |             |             |
|--|------------------------------|-----------------------------|-------------|-------------|
| Supervisor notified of incident              | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Time: ..... | Date: ..... |
| Form completed by injured person             | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Time: ..... | Date: ..... |
| Supervisor's comments noted                  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Time: ..... | Date: ..... |
| Form forwarded to OH&S Manager               | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Time: ..... | Date: ..... |
| Copy forwarded to Head of School / Work Unit | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Time: ..... | Date: ..... |

# APPENDIX L- DAN DIVING INJURY REPORT FORM (PART)

## DAN DIVING INJURY REPORT FORM (DIRF)

PAGE 1

DAN Chamber Code

(Diver Completes Pages 1 & 4)

Chamber Patient ID #



Last Name \_\_\_\_\_

First Name \_\_\_\_\_ MI \_\_\_\_\_

Daytime Telephone # \_\_\_\_\_

Evening Telephone # \_\_\_\_\_

Male  Female

Date of birth (mm/dd/yy) \_\_\_\_\_

Height \_\_\_\_\_ cm or ft/in    Weight \_\_\_\_\_ kg or lbs

Are you a certified Diver?  Yes  No

If yes, year first certified \_\_\_\_\_

Highest certification \_\_\_\_\_

Number of dives in past 12 months \_\_\_\_\_

Number of dives in past 5 years \_\_\_\_\_

Are you a volunteer for **Project Dive Exploration** or Project Safe Dive?  Yes  No

**Check all medications you currently take**

- Decongestant/Antihistamine/Allergy
- None  Inhaler for Asthma
- Diarrhea  Oral Asthma Drug
- Motion Sickness  Pain Killer
- Anticonvulsant  Anti-Malarial
- Insulin  Other (List in 'Comments')

**Check all current health problems**

- None  Heart Disease
- Asthma  Back Pain
- High Blood Pressure  Joint/Muscle Pain
- Diabetes  Other (List in 'Comments')

**Check all past health problems**

- None  Ear/Sinus Surgery
- Treated for DCS/AGE  Asthma
- Back Surgery/Problem  Ear Barotrauma
- Lung Surgery/Problem  Other (List in 'Comments') (3)

**Cigarette~ smoking**

Do you smoke cigarettes?  Yes  No

If yes, how many packs per week? \_\_\_\_\_

How many years have you smoked? \_\_\_\_\_

**For women**

- Menstruating during dive series?  Yes  No
- Do you take oral contraceptives?  Yes  No
- Are you pregnant?  Yes  No
- Are you post-menopause?  Yes  No

**Dive series** (all dives or altitude exposures with less than a 48-hour surface interval)

Dive Site: Country \_\_\_\_\_ State/Province \_\_\_\_\_

Total # Days Diving \_\_\_\_\_ Total # of Dives \_\_\_\_\_

Last Dive Ended: Date \_\_\_\_\_ Time: \_\_\_\_\_

Max Depth in Series \_\_\_\_\_ fsw or msw (circle)

Max Depth of Last Dive \_\_\_\_\_ fsw or msw (circle)

Were all dives at sea level?  Yes  No

If no, altitude of dive site \_\_\_\_\_ ft or m (circle)

Altitude exposure between dives?  Yes  No

Did you make any safety stops?  Yes  No

**How did you conduct your dive when injury occurred?**

- Dive Computer  Follow Anot her Di ver
- Dive Table  Other (List in 'Comments')

**Altitude exposure after diving**

Within 48 hours of last dive?  Yes  No

If yes, surface interval \_\_\_\_\_ hrs

Altitude (if known) \_\_\_\_\_ ft or m (circle)

- Commercial Fixed Wing  Mountain Travel

**Purpose of dive when injury occurred**

- Recreational  Instructor/Guide
- Technical  Scientific
- Student  Military
- Other (specify) \_\_\_\_\_

**Breathing apparatus when injury occur~**

- Open-Circuit Scuba  Closed-Circuit Scuba
- Semi-Closed Scuba  Surface-Supplied

Other (snecifv) \_\_\_\_\_

**Breathing gas when injury occurred**

- Air  Heliox % 02 \_\_\_\_\_
- Nitrox (EAN) % 02 \_\_\_\_\_  Other (List in 'Comments') (Ear Barotrauma) Other (Lis

**Diving dress when injury occurred**

- Wetsuit
- Diveskin
- Other (specify) \_\_\_\_\_  Swim suit
- Drysuit

**Problems during dive when injury occurred**

- Out of Air  Nausea / Dizziness
- Rapid Ascent  Injury  Yes  No
- Missed Decompression  Cold
- Heavy Exertion  Short of Breath
- Equipment (List in 'Comments')  Other (List in 'Comments')

**Where were you diving when you were injured?**

- Ocean/Sea                       Lake/Quarry/River  
 Tank/Pool                         Cavern/Cave  
 Dry Chamber                     Other (List in 'Comments')

**DIVER'S DESCRIPTION** (To be completed by diver)

- How did you feel before your last dive?**                       Good    Fair    Tired    Exhausted    Hungover  
**Did you have symptoms before your last dive?**                       Yes     No    *If yes, explain in 'Comments.'*  
**Did you have symptoms underwater or at altitude?**                       Yes     No    *If yes, explain in 'Comments.'*  
**Were you given emergency oxygen?**                       Yes     No    *If yes, list date, time, method, flowrate & duration in 'Comments.'*  
**Were you treated in a chamber for this dive series?**                       Yes     No    *If yes, list where and when in 'Comments.'*

In order of onset, what were your symptoms and their severities on a scale of 1 (minor) to 10 (worst possible) ?	Where were the symptoms in your body?	What dates and times did the symptoms occur?
1st:		
2nd:		
3rd:		
4th:		
5th:		
6th:		

**COMMENTS** (other symptoms, changes in symptoms, of dive profile, emergency O2, recompression, etc)

**RELEASE FOR RESEARCH STATEMENT** I understand that this form is for research only and not for insurance purposes. All information will be kept strictly CONFIDENTIAL. I understand that International Divers Alert Network (IDAN) may contact me for clarification. This release authorizes any hospital, medical clinic, physician, nurse and/ or the keeper of medical records to divulge, give, and/ or permit to copy any information pertaining to the medical condition or history of the undersigned to IDAN only. I agree that a copy of this statement shall have the same validity as the original.

Diver Signature \_\_\_\_\_

Date \_\_\_\_\_

Signature of Witness to Release \_\_\_\_\_

Date \_\_\_\_\_

## APPENDIX M – MEDICAL/RESCUE CONTACTS

The following table lists South Pacific Underwater Medicine Society (SPUMS) registered doctors in the northern rivers region and south eastern Queensland who may be consulted on diving medical matters or to obtain commercial diving medicals.

Name	Address	Contact number	Performs commercial medicals?
Dr Bruce G Cameron	Tweed City Family Practice Shop 128 Tweed City Shopping Centre 54 Minjungbal drive, TWEED HEADS SOUTH, NSW 2486	0401 001 646	YES
Dr David A Chan	Sorrento Medical Centre 1 Allawah Street, SORRENTO, QLD 4217	07 5592 1722	YES
Dr C J MacDonald	Shop 10 26-54 River Street, BALLINA, NSW 2478	02 6686 4166	YES
Dr Alan MacKenzie	Surfers Paradise Day & Night Medical Centre 3221 Gold Coast Highway, SURFERS PARADISE, QLD 4217	07 5592 2299	NO
Dr James Nicholson	Cape Byron Medical Centre 4 Marvel St, BYRON BAY, NSW 2481	02 6685 6326	NO
Dr Max C L Wong	Doctors at Coomera Shop 21/22 Coomera Village Shopping Centre Dreamworld Parkway, COOMERA, QLD 4210	07 5500 0436	YES

As a minimum dive coordinators should be aware of the following emergency contacts in the northern rivers and south-east Queensland region.

Service	Address (if applicable)	Contact number
Diving Emergency Service (DES) / Diver Alert Network (DAN)		1800 088 200
Emergency services		000 (112 on some mobiles)
NSW Water Police		1800 658 784
Westpac helicopter rescue	60 Brunswick St LISMORE. NSW. 2480	02 6627 4444
Hyperbaric chamber	The Wesley Centre for Hyperbaric Medicine Ground Floor Suite 53, Sandford Jackson Building, Chasely Street, AUCHENFLOWER, Qld 4066	07 3371 6033
Hospitals (Ballina)	Ballina District Hospital	02 6686 2111

	Cherry Street, BALLINA, 2478	
Hospitals (Byron Bay)	Byron District Hospital Shirley Street, BYRON BAY, NSW 2481	02 6685 6200
Hospitals (Coffs Harbour)	Coffs Harbour Base Hospital 345 Pacific Highway, COFFS HARBOUR, 2450	02 6656 7000
Hospitals (Grafton)	Grafton Base Hospital Arthur Street, GRAFTON, 2460	02 6640 2222
Hospitals (Kempsey)	Kempsey District Hospital 119 River Street, KEMPSEY, 2440	02 6562 6155
Hospitals (Lismore)	Lismore Base Hospital Uralba St, LISMORE, 2480	02 6621 8000
Hospitals (Macksville)	Macksville District Hospital Boundary Street, MACKSVILLE, 2447	02 6568 1366
Hospitals (Maclean)	Maclean District Hospital Union Street, MACLEAN, 2463	02 6640 0111
Hospitals (Port Macquarie)	Port Macquarie Base Hospital Wright's Road, PO Box 2466, PORT MACQUARIE, 2444	02 6581 2000
Hospitals (Tweed Heads)	The Tweed Hospital Powell Street, TWEED HEADS, 2485	07 5536 1133

# APPENDIX N - FIELD NEUROLOGICAL EXAM

Examination of an injured diver's central nervous system soon after an accident may provide valuable information to the physician responsible for treatment. The Five-Minute Neuro Exam is easy to learn and can be performed by individuals with no medical experience. The examination can be done whilst reading from this manual. Perform the following steps in order, and record the time, and the results for each test.

## 1. Orientation

- Does the diver know his/her name and age?
- Does the diver know the present location?
- Does the diver know what time, day, or year it is?

Even though an individual may appear alert, answers to these questions can reveal confusion. Do not omit them.

**2. Eyes:** Have the diver count the number of fingers you display, using 2 or 3 different numbers of fingers. Check each eye separately and then together. Have diver identify a distant object. Tell diver to hold head still - or you gently hold it still - while placing your other hand about 18 inches (slightly less than 0.5 m) in front of the face. Ask diver to follow your hand. Now move your hand up and down, then side to side. Diver's eyes should follow your hand and should not jerk to one side and return (called nystagmus). Check that the pupils are equal in size.

**3. Face:** Ask the diver to whistle or purse their lips. Look carefully to ensure both sides of the face have the same expression whilst whistling. Ask them to grit their teeth & feel their jaw muscles to confirm they are contracted equally. Instruct the diver to close his/her eyes while you lightly touch your fingertips across their forehead and face. Confirm that sensation is present, and feels the same everywhere.

**4. Hearing:** Evaluate the diver's hearing by holding your hand about two feet from the individual's ear and rubbing your thumb and finger together. Check both ears by moving your hand closer until the diver hears it. Check several times and compare with your own hearing. NB. If the surroundings are noisy, this test is difficult to evaluate. If necessary, ask any bystanders to be quiet and turn off unneeded machinery.

**5. Swallowing Reflex:** Instruct diver to swallow while you watch their "Adam's apple". Ensure it moves up/down.

**6. Tongue:** Instruct diver to stick out their tongue. It should come out straight in middle of the mouth without deviating to either side.

**7. Muscle Strength:** Instruct the diver to shrug their shoulders while you bear down on them, to observe for equal muscle strength. Check the diver's arms by bringing their elbows up level with their shoulders, hands level with the arms, and touching their chest. Instruct the diver to resist while you pull their arms away, push them back, and move them up and down. The strength should be approximately equal in both arms in each any direction. Check leg strength by having the diver lie flat and raise and lower their legs while you resist the movement.

**8. Sensory Perception:** Check on both sides by touching lightly as was done on the face. Start at the top of the body and compare sides while moving downwards to cover the entire body. The diver's eyes should be closed during this procedure. The diver should confirm the sensation in each area before you move to another area.

**9. Balance and Coordination:** Be prepared to protect diver from injury when performing this test. Have diver stand up with feet together, close their eyes and stretch out their arms. The individual should be able to maintain balance if the platform is stable. Your arms should be around, but not touching the individual, in case they fall.

**Be prepared to catch a diver who starts to fall.**

Check coordination by having diver move an index finger back and forth rapidly between their nose and your finger - held approximately 18 inches (slightly less than a half meter) from their



face. In another test of coordination, instruct the diver to slide the heel of one foot down the shin of the other leg while lying down.

Conduct these tests on both right and left sides, and observe carefully for differences between the two sides. Tests 1, 7, and 9 are the most important, and should be given priority if not all tests can be performed. The diver's condition may prevent the performance of one or more of these tests. Record any omitted test, and the reason. If any of the tests appear abnormal, injury to the central nervous system should be suspected. The tests should be repeated at frequent intervals while awaiting assistance, to determine if any change occurs. Report the results to the emergency medical personnel responding to the call.

**Good diving safety habits would include practicing this examination on normal uninjured divers, to gain proficiency in use.**

## RAPID FIELD NEURO EXAM RECORD FORM

Diver's Name: \_\_\_\_\_ Name of Examiner: \_\_\_\_\_ Date: \_\_\_\_\_

Initial \_\_\_\_\_  
Complaint: \_\_\_\_\_

Time	:	:	:	:	:	:	:	:	:
	YES	NO	YES	NO	YES	NO	YES	NO	YES
Mental Status: Does he/she know									
1. His/her name?									
2. Where he/she is?									
3. Time of day?									
4. Most recent activity?									
5. Speech is clear/correct?									
<b>Sight:</b>									
1. Correctly counts fingers?									
2. Vision clear?									
<b>Eye movement:</b>									
1. Move all four directions OK?									
2. Nystagmus absent?									
<b>Facial Movements:</b>									
1. Teeth clench OK?									
2. Able to wrinkle forehead?									
3. Tongue moves in all directions?									
4. Smile is symmetrical?									
<b>Head &amp; Shoulder Movements:</b>									
1. Adam's apple movement?									
2. Shoulder shrug normal, equal?									
3. Head movements normal, equal?									
<b>Hearing:</b>									
1. Normal for that diver?									
2. Equal both ears?									
<b>Sensations: Present, normal and symmetrical across:</b>									
1. Face									
2. Chest									

3. Abdomen									
4. Arms (front)									
5. Hands									
6. Legs (front)									
7. Feet									
8. Back									
9. Arms (back)									
10. Buttocks									
11. Legs (back)									
<b>Muscle Tone: Present, normal and symmetrical for:</b>									
1. Arms									
2. Legs									
3. Hand grips									
4. Feet									
<b>Balance and Coordination:</b>									
1. Rhomberg OK?									
2. Pulse									
3. Respiration									

Nystagmus – involuntary oscillation of the eyeball. Usually lateral, but sometimes rotary or vertical.

Rhomberg – Patient stands with feet together, arms extended in front with palms up, and eyes closed. Should be able to retain balance for 1 min.

# APPENDIX O – EQUIPMENT SERVICE REQUIREMENTS

## Equipment service intervals (extract from UTAS diving manual)

SCUBA tank	Annual service/test required at qualified test station
Regulator/Contents gauge	Annual service required by a qualified technician
Depth gauge (mechanical) Must be checked for accuracy every three months	To be checked for accuracy every three months
Depth gauge (electronic)	To be checked for accuracy every six months
Dive computer	Depth sensor must be checked for accuracy every six months
BCD inflator unit/valves	Annual check required