Code of Practice for Diving

August 2015

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PREFACE

This is the third edition of the University of Otago Code of Practice for Diving. It incorporates the latest "good practice" diving standards. All legal requirements under the Ministry of Business Innovation and Employment, Guidelines for Occupational Diving and relevant Australian/New Zealand Standards are correct at time of printing. Legislation may have changed since printing this code and in that case diving activity should be consistent with the legislation that is current.

All students and staff who are currently scuba or snorkel divers, or intend diving as part of their research activities, or as diving assistants for other staff or students must comply with the practices outlined in this Code of Practice. Divers should follow the flow chart in Appendix 15 to assist them in determining what requirements need to be undertaken before they can dive in any activity associated with the University of Otago.

Further information is available at otago.ac.nz/healthandsafety/Diving/index.html

PURPOSE

The purpose of the Code is:

1. to establish safe diving procedures and foster a safety conscious culture which optimises the productivity of the University of Otago's diving operation
2. to ensure that all diving is conducted in a manner which minimises and/or prevents diving accidents, injuries or illnesses
3. to administer and maintain industry standards for divers.

SCOPE

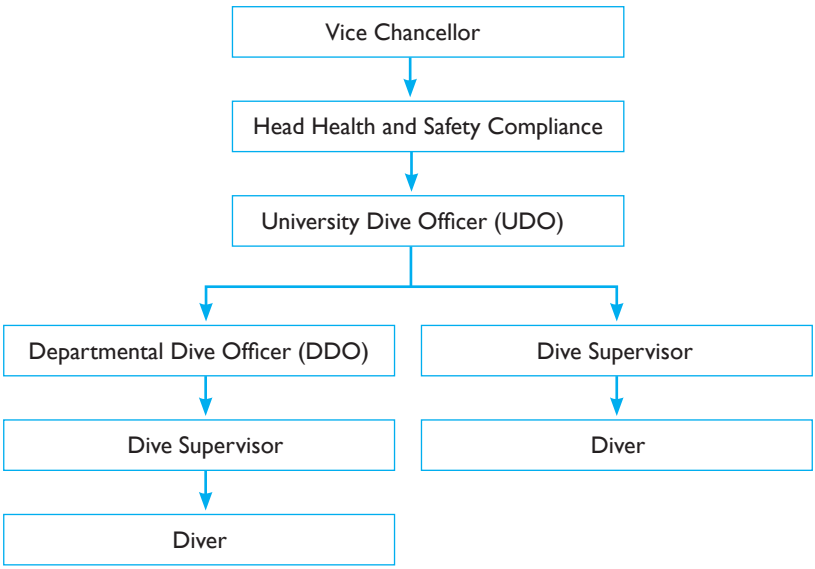
This Code applies to:

- Diving activities in New Zealand and overseas where those activities form part of the research or work of any University employee or student
- Employees of the University of Otago undertaking diving activities
- Students involved in diving either on a part or full-time basis while undertaking research or studies at the University of Otago
- Anyone diving as a volunteer for any student or staff member or on behalf of the University of Otago
- Diving activities from University vessels
- Other persons who are diving for hire or reward for the University of Otago.
- Visitors from other institutions diving in association with the University of Otago
- Subcontractors undertaking work for the University of Otago or its staff/students as part of their research
- Employees undertaking dive training activities as a requirement of their employment
- For the purpose of this document the words diving and divers relates to both scuba and snorkel divers.

This code does not apply to:

- Diving for pleasure conducted by students or staff of the University of Otago that has no relationship to their research, studies or work
- Diving undertaken by members of the University of Otago Dive Club for recreation.

Figure 1: University Dive Structure



ROLES

UNIVERSITY DIVING OFFICER

The University Dive Officer (UDO) shall be an OSH registered scientific diver, with a broad experience in diving. He or she should also be a certified and current instructor.

Responsibilities

1. To advise the University of Otago on diving policy
2. To be responsible for all diving activities that are carried out in association with the University of Otago
3. To establish policy for safe diving practices
4. To ensure that all divers are adequately trained and certificated
5. To review reports on diving incidents and ensure that all divers are informed of procedures to be taken to avoid a re-occurrence
6. To carry out ongoing assessments of diving procedures and activities
7. To Represent the University of Otago at a national and international level with regard to diving policy
8. To Represent the University of Otago in any legal proceedings
9. To restrict, prohibit or suspend diving activities, programmes or practice as he/she thinks necessary to maintain safe and compliant operations
10. Assess divers competencies and record the evidence used in the assessment.

DEPARTMENTAL DIVE OFFICER

Individual departments or schools within the University of Otago may have a Departmental Dive Officer (DDO). The DDO will be appointed by the HOD of their department in consultation with the UDO. The DDO represents the HOD and is responsible for the safe conduct and the day to day operation of that specified department within the University of Otago.

Responsibilities

1. Maintaining diver records within their department
2. Reviewing and approval of dive plans as described in Table 1 Approvals of dive plans
3. Forward dive plans to the UDO for approval and consult with the UDO over dive plans that fall outside the responsibility of the DDO
4. Ensure dive equipment owned by their department is maintained according to manufacturers, MBIE and department requirements and maintenance records are available for audit purposes
5. Collect and collate dive data from the Dive supervisor and DAS post-dive and forward these to the UDO on a weekly basis
6. Communicate with divers in the department, the HOD, UDO and DAS any changes to legislation or policy, , and other relevant information that will enable improvements in diving practices in the department and the University
7. Reporting incidents/accidents to the UDO and the HOD. Refer Section on Accident Management.

DIVE SUPERVISOR

The dive supervisor (DS) is responsible for the overall safety of the diving operation. The role and nomination of the dive supervisor should be discussed with the DDO prior to the planning phase of the trip.

The dive supervisor could be a Diving Activities Supervisor, Boat skipper with equivalent experience and skills who is in training as a DAS or a Full Scientific Diver.

Responsibilities

1. Ensure that the trip is covered by an up to date and relevant hazard assessment
2. To provide DDO or UDO for approval a dive plan as per Table 1 prior to the dive taking place
3. To ensure that the University of Otago Code of Practice for Diving is adhered to on the dive site
4. To ensure that the divers are physically fit and have current certification to dive
5. To ensure that the divers understand the work that they are to perform and to explain the necessary safety standards and emergency procedures to be used
6. To check that the divers have the necessary equipment and that it is in a safe operating condition
7. To ensure that the surface support is adequate and that they understand the procedures they must follow
8. To ensure that conditions are safe for diving and to terminate diving at any stage of the operation should conditions become unsafe
9. To keep an accurate record of all dives (Dive roster). This responsibility may be delegated, preferably to a person who has no other duties during the dive such as the skipper but the responsibility of ensuring the data is collected and forwarded to the DDO is that of the DS
10. To provide a copy of the completed and signed dive roster to the DDO as soon as practicable post dive or dive trip
11. In the event of a serious or significant accident, to take charge and ensure that the necessary procedures are followed and that a record of the diver's condition is kept and his or her equipment is held for inspection by the UDO
12. To report any accident, incident or near miss to the UDO.

DIVER

Every diver must be currently certificated, be physically fit for diving and have the necessary training and preparation for the dives to be undertaken.

Responsibilities

1. To maintain suitable fitness and preparation for the dives to be undertaken
2. To maintain equipment supplied in a safe operating condition, and to ensure that adequate personal equipment is available for the dives to be undertaken. (Divers who are using their own equipment shall ensure that buoyancy compensators, regulators, pressure gauges, computers, tanks, etc have been checked by an authorised service agent in the last 12 months)
3. To understand the parameters of each dive plan and undertake to stick to the dive plan unless conditions arise that would make it unsafe to do so
4. To complete a pre-dive check of their equipment and that of their buddy before diving
5. To ensure a dive leader has been appointed and that the dive signals, plan, pattern and emergency procedures are understood
6. Not to dive if equipment or conditions are unsafe or beyond the diver's capabilities, or if the dive plan or procedures are considered unsafe
7. To report immediately any equipment malfunction, a diving accident or incident, any injury or illness or near miss to the DS
8. To record all dives and maintain their personal dive logbook
9. To have at the dive site hard copies of their last ten dives
10. To adhere to this Code of Practice for Diving. This includes to make available copies of qualifications, dive medicals and other documents as required under this code.

CATEGORIES OF UNIVERSITY DIVERS

PROVISIONAL SCIENTIFIC DIVER

To be granted provisional scientific status divers must meet the requirements of authorisation and currency.

Provisional Scientific Divers may:

- Conduct dives for research purposes under the direct supervision of a Full Scientific Diver

FULL SCIENTIFIC DIVER

If the diver is receiving reward for diving s/he will require full scientific diver status. To be granted full scientific status in addition to the criteria for provisional diver status s/he must also have:

A MBIE Limited Certificate of Competency for Scientific diving.

business.govt.nz/worksafe/information-guidance/all-guidance-items/guidelines-for-occupational-diving

Full Scientific Divers may:

- Supervise provisional scientific divers undertaking dives for research
- Act as Dive Supervisors
- Conduct dives for research

CONTRACTORS AND SUB-CONTRACTORS

This category includes those conducting any type of diving involving University resources or support where the University has a role as the principal or the sub-contractor. Principals must take all practicable steps to ensure that person's in or in the vicinity of the place of work (vessels, dive site) are not harmed. Diving contractors and sub-contractors are required to submit a dive plan through the DDO to the UDO.

VOLUNTEERS

A volunteer (not already enrolled in the University of Otago) requires a formal affiliation/contract with the University via Human Resources. This can be facilitated through the DDO and/or the departmental administrator.

Once a affiliation/contract letter is obtained a volunteer diver is required to meet the same authorisation requirements as a Provisional Scientific Diver. A volunteer diver shall not receive reward for diving.

AUTHORISATION, CERTIFICATION AND CURRENCY

SCUBA DIVERS AUTHORISATION

Authorisation is on an annual basis. To gain authorisation all scuba divers will complete the following:

1. Certification at Rescue level, equivalent, or above from an approved diver certifying organization satisfactory to the UDO
2. Pass a MBIE Occupational dive medical
3. Successfully completed a primary care (CPR) first aid course within the last 12 months
4. Successfully completed an approved oxygen delivery course within the last 24 months
5. Successfully completed a secondary care first aid course every 24 months. (The University runs a workplace first aid and a CPR/first aid course every year. By attending one of these course on alternate years you will fulfill the requirements #3, #4 and #5 above)
6. Passed a check out dive within the previous 24 months (appendix 11)
7. Have read and understood and agreed to abide by the University Of Otago Code Of Practice for Diving.

Where a diver's diving activities justify it, the diving officer may prescribe special requirements or standards.

SCUBA DIVERS CURRENCY

To remain current the scuba diver must have completed the following every year:

1. Completed the MBIE Occupational dive medical and self-check
2. Completed a minimum of 40 minutes bottom time every six months and not less than two dives or at the discretion of the UDO
3. Provide a hard copy of your log book to the DDO every six months
4. Successfully completed a primary care first aid course in the last 12 months
5. Successfully completed a secondary care first aid course every 24 months. (The University runs a workplace first aid and a CPR/first aid course every year. By attending one of these course on alternate years you will fulfill the requirements of the code)
6. Approved oxygen delivery course in the last 24 months
7. Passed a checkout dive in the preceding 24 months (appendix 11)
8. Comply with any other legislative requirement.

SNORKEL DIVERS AUTHORISATION

Authorisation to snorkel dive requires all snorkel divers to have completed the following:

1. Certification from an approved snorkel diver certifying organization satisfactory to the University Diving Officer (PADI skin diver, Open Water diver or equivalent)
2. Completed the SPUMS dive medical as above
3. Successfully completed a primary care first aid course within the last 12 months
4. Successfully completed a secondary care first aid course every 24 months. (The University runs a workplace first aid and a CPR/first aid course every year. By attending one of these course on alternate years you will fulfill the requirements of the code)
5. Approved oxygen delivery course in the last 24 months
6. Passed a check out snorkel dive within the previous 24 months (appendix 11)
7. Have read and understood the University of Otago Code of Practice for Diving.

SNORKEL DIVERS CURRENCY

Authorisation is on an annual basis and to remain current the snorkel diver must have:

1. Passed the prescribed medical examination
2. Completed a minimum of two snorkel dives over two separate days every six months
3. Attended a resuscitation and first aid course in the last 12 months
4. Passed a checkout snorkel dive in the preceding 24 months (appendix 11)
5. Comply with any other legislative requirement.

LAPSE OF AUTHORISATION

A diver or snorkel diver who has allowed his or her authorisation to lapse and wishes to renew it must complete:

1. Meet all requirements for the dive category they wish to be granted
2. Complete a check out dive.

REMOVAL OF AUTHORISATION TO DIVE

A diver's authorisation to dive will be revoked if the diver:

1. Fails to meet the medical standard
2. Conducts diving activities outside the requirements of the Code of Practice
3. Is negligent in the performance of their diving duties
4. Does not meet the requirements to retain authorization
5. Conducts unsafe dive activities.

To have their authorisation re-instated after removal of authorisation the diver should write to the UDO stating the specific reasons why they should have their authorisation re-instated. In some cases the UDO may require the diver to undertake some remedial training. Re-instatement is at the discretion of the UDO in consultation with the DDO and HOD Health and Safety. All other requirements for currency also apply.

MEDICAL REQUIREMENTS

Scuba Divers must hold a current MBIE occupational medical clearance. Snorkelers must hold a SPUMS medical clearing them to snorkel.

There are a number of medical conditions that might prevent someone from undertaking scuba and snorkel diving. All divers take responsibility for their own medical fitness to dive and if in doubt should consult a medical doctor trained in hyperbaric medicine. In cases of minor illness such as a head cold divers will be able to assess their fitness to dive safely. After medical injury, illness or surgery a fresh medical clearance may be required. Please check your health status with the DDO or UDO to confirm whether a new medical is necessary.

Any medications should be checked with a medical doctor trained in hyperbaric medicine prior to undertaking a dive. Full disclosure of medications must be made during the diving examination, to the dive supervisor and the DDO.

LOG BOOKS

Divers are required to keep a personal log of dives, a hard copy of which, showing the last seven days diving must be available for inspection at the dive site. Logged dive data should include depth, bottom time, names and roles of personnel involved, breathing medium (e.g. air), purpose of the dive, work completed and the equipment used. Otago University will retain a copy of your personal dive logs must be retained for a period of seven years (Refer Guidelines for Occupational Diving 2004, 4.10).

Dives should clearly differentiate between scuba and snorkeling activities. The dives are to be sequentially numbered and to include a cumulative total of dive time. Note that dive time is from the start of your descent to the start of your direct ascent to the surface. It does not include ascent travel time or safety stop time. All divers must supply copies of their divelogs to the DDO. The UDO may request dive logs, though generally these will be requested from all divers on a quarterly cycle.

DIVE OPERATIONS

A University of Otago approved dive plan is required for every dive that falls within the scope of this code of practice.

APPROVALS FOR DIVING

The DDO shall be involved in all dive planning and approval. Approval is required from the UDO for dives below 30m, solo diving, confined spaces, overhead environments, dives conducted outside New Zealand, Antarctic/Artic and Sub-Antarctic, Underwater habitat, diving with other organisations, Construction and dives of contractors.

If outside authorities bodies are involved a dive plan must be submitted to the governing body and the University for approval by both.

Where a diver intends to plan a dive that is outside of the parameters of the Code of Practice a specific waiver from the UDO should be requested in writing. Waivers are considered on a case by case basis. Any waiver given is only valid for the specific dive plan for which it has been sought.

DIVING WITH OTHER ORGANISATIONS

Where an external organization is responsible and also holds authorisation for diving activities the University of Otago reserves the right to ensure that all diving activities are carried out in accordance with this Code of Practice. The University of Otago must be assured that the diving is planned and carried out appropriately. In the case where a diver requires approval from a third party they will copy the third party approvals, dive plans and other documentation to the University Dive Officer as per the required timeframes below. It is possible in these cases that the divers will use the third parties dive planning format rather than the Otago University Dive plan.

The University Dive Officer will consider the dive plans and make a decision as to approval of the activity. The University Dive Officer is able to direct that diving activity does not occur in cases where he/she believes the dive plan and other evidence provided is inadequate, unsafe or falls outside of this Code of Practice. Possible third parties could include Antarctic New Zealand, other universities, subcontractors, contractors or organizations outside of New Zealand.

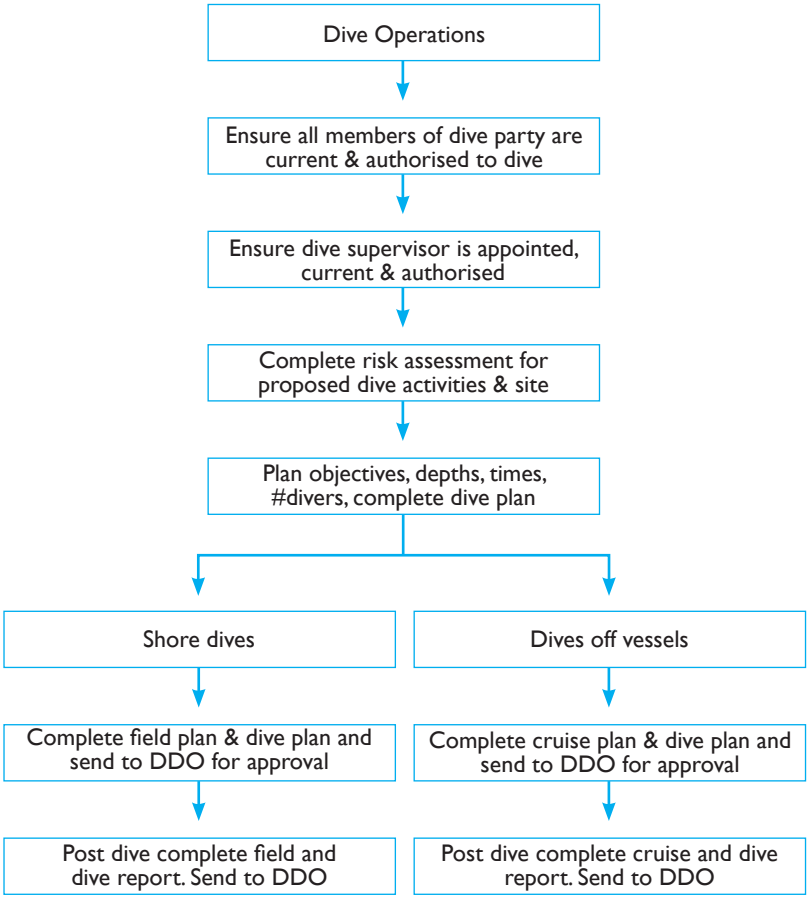
Visitors from other organisations – The DDO will compile copies of relevant certification documents (medical, first aid, logbook, diving qualification) and send them to the UDO for approval.

Otago University personnel diving with other scientific organisations – Otago University divers will provide the UDO through the DDO a copy of their dive plan for approval and any other documentation that has been submitted to the other scientific organization.

DIVE CHARTER AND TRAINING INSTITUTIONS

All diving activity that falls under the auspices of the Otago University will be conducted with charter operations or with training institutions that are reputable and meet all the relevant legislative requirements in their country of origin.

Figure 2: Dive operations summary



DIVE PARTY PERSONNEL

All dive activities require a team of three. This will include a Dive Supervisor and a Dive team of two divers as a minimum.

Each dive party should include a surface support person capable of rendering assistance and enacting the emergency assistance plan if required. The surface support person can be either the Dive Supervisor, Diver, Diver's attendant or the Diving Activities Supervisor (Refer to AS/NZS 2299.1:2007).

Ensure the divers selected have a current University authorization to dive. The basic safety unit is the buddy system - two divers working within visual or tactile (line) contact, one of whom is the designated leader. This contact must be maintained during the dive to ensure that the system is operating and divers can assist each other in an emergency. Where possible the 2-diver buddy system should be used as 3 person teams can often lead to buddy separation.

Where 3 divers operate as a team underwater a leader should be identified during the dive planning stage and take responsibility for navigation and maintaining group contact.

RISK ASSESSMENT

When planning a dive activity a full assessment of risk is required. Prior to any diving taking place the hazards related to the proposed activities must be identified and suitable measure to manage the hazards must be in place and understood by all persons involved (Refer Guidelines to Occupational Diving 2004, 4.1). The dive planning roster incorporates a template for risk assessment. Refer to otago.ac.nz/healthandsafety/Diving/index.html for templates (Appendix 15).

DIVE PLAN/S

In all cases dive plans must be submitted to the DDO. The DDO will forward the dive plan to the UDO where UDO approval is required prior to diving taking place. Depending on the nature of the diving activity the dive plan will be considered and approved by either the DDO or the UDO (refer Table 1) (Dive plan templates are found in the Appendix 16, and otago.ac.nz/healthandsafety/Diving/index.html

All dive plans must be approved in writing prior to the dive taking place. A copy of the dive plan will be provided by the DDO to the vessel skipper. A hard copy of the dive plan must be available at any dive site where diving is taking place (the dive roster covers all necessary dive plan parameters required).

Dive plans must include:

- Event title
- Vessel
- Diving logistics – Procedures and planning that have been completed to ensure the dive runs smoothly. Includes any other codes of practice that apply
- General description of diving activities - How the dive will proceed on the day, Equipment checks, buddy systems, supervision, navigation, and boating or shore diving procedures
- Air management – numbers of tanks required, tank supplier (clean air)
- Planned depth and bottom time
- Surface intervals between dives
- Location and Site name
- Site description including prevailing weather conditions, tidal impacts, seabed type, entry and exit points, depth profile, and water temperature
- Objectives
- Names , dive qualifications , role and emergency contacts of members of the dive party
- Emergency Assistance Plan – including the appropriate phone numbers for evacuation, medical assistance and the nearest recompression chamber, first aid equipment, oxygen and communications equipment
- Weather conditions that would prevent diving at the site
- Weather forecast – includes swell, wind direction and strength, high tide time, HT height (to be entered on the dive log on the day of the dive from the most up to date forecast).

Table 1: Approvals of dive plans

Dive Type	Submit days prior	UDO approves	DDO approves
Routine local dives (Fiordland, Otago, Stewart Isld	5		√
International	10	√	
Antarctic/Arctic/UW Habitat	20	√	
Science Institutions	10	√	
Charters	10	√	
Contractors/Construction	10	√	
Waivers	20	√	

1. **Dives off vessels:** Some departments require a cruise plan while others require a fieldplan which incorporates vessel activities. Both of these need to comply with the University of Otago fieldwork guidelines

   otago.ac.nz/healthandsafety/news_links/

   Submit your cruise/field plan with your dive plan for approval as per your departmental requirements

2. **Shore dive – field plans:** Submit your field plan with your dive plan for approval as per your department requirements

3. **Post-dive documentation and reporting:** The Dive Roster is the on-board/ shore based record keeping system that records the actual dive activity that takes place (Refer Appendix 16). The Dive Supervisor should complete the dive roster information as the day progresses and send to the DDO as soon as practicable a scanned copy after the dive trip but at least within one week of your return.

EQUIPMENT

All diving at Otago University is undertaken on air using self-contained breathing apparatus. Refer Appendix 3,4 and 5 for further information regarding equipment.

During all scuba dives divers are required to wear:

- Buoyancy compensating device
- A compass
- A depth gauge (or computer)
- A timer (or computer)
- An appropriate exposure suit – in Dunedin two piece 7mm suit with hood, booties and gloves or drysuit. Where Drysuits are worn specific dive check skills and approval is required (Appendix 11)
- A visual signaling device (safety sausage or similar)
- A cutting device (dive knife, shears or similar)
- Mask
- Fins
- Snorkel
- Regulator with a pressure gauge and two working second stages
- Dive cylinders

All snorkel divers are required to wear:

- An appropriate exposure suit – in Dunedin two piece 7mm suit with hood , booties and gloves or drysuit. Where drysuits are used specific dive check skills and approval is required (Appendix 11)
- A cutting device (dive knife, shears or similar)
- Mask
- Fins
- Snorkel
- A visual signaling device (safety sausage or similar) is a useful piece of equipment for snorkellors and they are encouraged to carry one especially in areas with currents)

AIR MANAGEMENT

Divers must return to the surface with at least 300-500 psi (50 BAR) of air in their tanks. Dive plans should take into consideration all dive members and their air consumption rates.

USE OF AIR COMPRESSORS TO FILL DIVE CYLINDERS

All persons using a compressor for filling dive cylinders are required to hold an approved fillers certification under the Hazardous substances regulations 2001. Refer to the DDO or UDO to find out dates for courses in cylinder filling. Dive cylinders require annual certification and compressors are air tested quarterly to ensure the air is clean. This equipment is managed by the DDOs in each department.

SAFETY STOPS

All dives below 10m should include a safety stop of 3-5 minutes at 5m.

Extra deep stops are recommended if diving below 20m and if gas supply and dive logistics allow. For example for a dive to 25m a stop at 18m for three minutes followed by a stop at 10m for three minutes and finally one at 5m for three minutes will allow nitrogen to be eliminated more efficiently than simply surfacing to a safety stop at 5m.

MULTIDAY DIVE PLANNING

After every five days of diving a full day of rest *with no diving at all* must be allowed for.

CURRENT GOOD PRACTICE IN DIVING

BEFORE LEAVING FOR THE DIVE SITE

1. Make sure that the divers have checked that they have sufficient, safe and functioning equipment for the dive
2. Check that work task equipment is operational
3. Check operation of safety equipment (in particular emergency equipment such as the resuscitator, the radio telephone and the surface support vessel)
4. Inform authorities that control waterways of your intention to dive
5. Weather forecast – check the weather forecast indicates conditions that are suitable for safe diving.

AT THE DIVE SITE

1. Check dive site conditions:
    a. surface conditions (are they deteriorating, improving or stable, how do they relate to the forecasted conditions?)
    b. entry and exit points
    c. traffic in the area
    d. for boat dives check the dive site profile using the sounder
2. Check that divers wish to dive and are capable of diving in the light of the present and the predicted conditions and the individual physical conditions.
3. Establish emergency procedures so that:
    a. specific tasks are given to the surface support personnel and the divers for use in emergencies
    b. emergency signals are understood by the surface support personnel and the divers, especially hand signals and recall procedures so rapid retrieval of an injured or sick diver can be made
    c. facilities are made as suitable as possible for first aid assistance and the rapid evacuation of the injured or sick diver to medical assistance
    d. communication for medical advice can be made quickly.

DIVE BRIEFING

Brief the dive team of the following:

a. objective of the dive
b. planned time and depth of dive
c. individual tasks and responsibilities (the position of dive leader must be clearly established)
d. orientation and location of work site (depth, direction and physical features)
e. termination of dive (outline conditions that would terminate the dive apart from completing objective, e.g., no decompression time limit)

f. physical and biological hazards
g. emergency procedures
h. flexibility of dive plan
i. communication within the group and with the surface support.

Check that:

1. the surface support personnel are in position
2. the surface support equipment is in position and functioning correctly, e.g., flags, lights, lines and support boat.

In particular:

3. the record keeper has a current record of each diver including excess nitrogen loading (repetitive group)
4. an accurate, functioning and correct timing system
5. a set of Dive Tables
6. the stand-by diver is ready to dive
7. the support boat skipper is ready to assist
8. where possible, underwater and surface hazards have been eliminated or minimised
9. where there is a possibility that the divers may exceed the no-decompression limit or where precautionary stops are to be made, that there is a spare regulator and a full cylinder for each diver. A lazy shot must also be provided if required
10. the divers are adequately equipped on entering the water. This includes a visual check that they have a compensator, a pressure gauge (with adequate air pressure) and sufficient and accessible quick release buckles
11. if the diving platform is on board a ship, the captain must be informed so that the vessel does not use equipment or the crew act in a manner that may injure the divers
12. Ensure that at least one person is watching for the divers. This check must be maintained from the time the divers enter until they leave the water
13. Check that the time keeper is maintaining adequate and correct records and will be able to:
    - inform the Dive Supervisor should a diver come within 5 minutes of the no decompression limits
    - inform the Dive Supervisor of the current depth and remaining time for a diver who is decompressing
14. Check that the surface support equipment continues to function throughout the dive
15. Check that conditions have not become so adverse that diving operations must cease Diving operations should cease if the site is exposed to seas of greater than Beaufort Force 4.

1. Check with the divers as they come on board for information of:
    a. changes in underwater conditions which could affect subsequent dives, e.g., change in the speed or direction of a current
    b. the success in reaching the objective and any deviations from the plan the physical condition of each diver and any accidents which occurred underwater.
2. Check the dive records for accuracy.
3. Have divers report any faulty equipment as they store their gear – this will allow the maximum time for repairs or replacement.

AFTER THE DIVE IS COMPLETED

1. Check that all divers (and support personnel) are on board and report any symptoms or signs which may indicate illness.
2. Check that the divers are not involved in strenuous work and remain in shelter until they have warmed up.
3. Check that:
    a. the diving equipment is securely stored
    b. surface support equipment has been collected and stored and is not positioned so as to confuse other people in the vicinity, e.g., dive flags must not be flown while vessels are underway.
4. Report the completion of diving to the base through radio, telephone etc., and report in on return to base.

Any diver at any time for any reason should feel comfortable to decline to dive if they feel the conditions, activity or their fitness would expose them to extra risk.

Divers should be rotated to spend as much time as possible on the surface to allow for the best possible use of dive time. The dive profile should involve descent to the greatest depth with subsequent dive time spent working into shallower water. Ascents using a staged profile rather than a vertical ascent have been shown to reduce bubble nitrogen formation. The deepest dive of the day shall be made first and subsequent dives made into successively shallower water.

As few divers as possible should be in the water at any one time. The more divers in the water, the more difficult the operation is to handle, and the more likely are accidents.

After arriving at the dive site a pair of divers may make a preliminary dive to assess conditions particularly at new dive sites or where conditions are difficult to assess.

SIGNALLING SYSTEMS

All divers and dive support personnel should be familiar with the signals relevant to their diving activity. Before entering the water the divers should confirm the recall signal and the surface distress and 'OK' signals with the surface support. The International Code A flag must be flown when divers are in the water. This flag shall be positioned within 200 metres of the divers.

At night, diving operations off boats must be signalled by two red lights set in a vertical line two metres apart with a white light in the middle, visible for 3 kilometres. Night diving from shore should display two white lights in line vertically at the exit point .

AQUATIC ANIMALS

It is important for divers to understand the behavioural patterns of animals they are likely to encounter in the aquatic environment. Often ignoring the animal will result in it leaving the area and enabling the diver to continue their work. If a diver has any concern as to their safety or the safety of any other person with regards to aquatic animals at the dive site then they should calmly leave the dive site.

The guidelines for interacting with wildlife in the marine environment during University of Otago field activities is found in Appendix 12. Please note this guideline is not exhaustive.

Divers practicing good buoyancy skills will be able to minimize abrasions and stings. First aid procedures for stings and abrasions should be reviewed if you are diving in a new diving environment.

ALTITUDE AND FLYING AFTER DIVING

As a general rule after a single no-decompression dive, a diver should not fly until their repetitive factor has diminished to 1.0. After a repetitive dive or a decompression dive, a diver must wait 24 hours before flying.

When returning by car from some dive sites, e.g. Milford Sound and Doubtful Sound it will be necessary to traverse altitude that are sufficiently high to cause decompression sickness if a diver has recently left the water. Divers must not leave such sites unless their repetitive factor has diminished to 1.0.

MAXIMUM DEPTH OF DIVES

Diving under the University Code of Practice is limited to a maximum under the Guidelines for Occupational diving 2004 of:

- 30m for Scientific diving activities
- 39m for Construction divers with appropriate Certificate of Competency

The maximum depth for a diving operation will depend on:

1. the experience and fitness of the divers
2. the support facilities available, such as the presence of a recompression chamber
3. the location of the dive site. The altitude or remoteness of the dive site may limit the diving operations
4. external factors, such as whether the divers will be flying within 12 hours of diving.

ON-SITE DIVE PERSONNEL SAFETY

Divers shall not enter the water with any illness, injury, condition or medicated state that has the potential to affect their ability to undertake the objectives of the dive, make sound decisions, assist their buddy as required or cause them excess risk.

Divers shall not drink alcohol in the 12 hours before a dive, or for 8 hours after a dive.

Any medications should be checked with a medical doctor trained in hyperbaric medicine prior to undertaking a dive. Full disclosure of medications must be made during the diving examination, to the dive supervisor and the DDO.

SURFACE SUPPORT

The surface support person should:

- Maintain a watch of divers throughout the diving activity
- Support divers entering and exiting the water
- Understand the requirements of the underwater activity or work
- Have an understanding of the dive plan including the no-decompression limits, the entry and exit points, route being navigated, and expected return time
- Be capable of rendering first aid assistance
- Able to enact the emergency assistance plan including use of emergency communication systems
- Understand and be able to use surface signals
- Have a working knowledge of the equipment in use for the activity
- Be able to give and recognise the surface signals for "OK" and "distress"
- Understand how to assist the divers on surfacing and be capable of assisting an incapacitated diver out of the water
- Be prepared to abort the dive if their ability to support the divers is compromised.

ACCIDENT MANAGEMENT

In any scuba diving accident in which an injury has occurred it is not necessary to try to diagnose the condition but rather take key steps in the provision of first aid:

1. Assess Airway, breathing and circulation as per current first protocols
2. If breathing is not present open the airway
3. Provide CPR
4. If there is an AED available use the AED to monitor heart rhythm and provide shocks as required.
5. Call for help as per your emergency assistance plan
6. Provide emergency oxygen as per current protocol
7. Provide first aid for secondary conditions – Bleeding, etc
6. Monitor for shock

All dive team members should have a working knowledge of current first aid and oxygen protocols. Appendix 9 covers basic first aid procedures for diving accidents

In all cases of injury or illness as a result of diving, medical treatment should be sought.

ACCIDENT REPORTING

Where a diver suffers physical injury or becomes ill or as a result of diving activities or when an incident occurs the UDO should be informed immediately. Examples of incidents include: equipment malfunctions, dangerous environmental conditions and 'near misses'.

A meeting should be scheduled with the DDO, the dive supervisor and the UDO as soon a practicable to discuss the incident and to enter details of the event into Vault.

The type of information to be entered includes:

1. name, age, diving role of divers involved
2. location, time and date of accident/incident
3. nature of the work and/or task
4. type of accident and injuries and/or illness suffered
5. emergency procedures undertaken
6. first aid administered
7. equipment in use
8. environmental conditions at the time
9. Subsequent treatment provided by medical practitioner.

In the event of serious harm or a fatality the University Diving Officer must be informed immediately.

In such an event the University has a legal obligation to report the incident to the Ministry of Business Innovation and Enterprise. The Health and Safety Office will manage the investigation and any media releases. Depending on the severity of the incident MBIE and/or the Police will conduct the formal investigation of the incident.

DEFINITIONS

ADAS	The Australian Diver Accreditation Scheme
Bottom time	The total elapsed time from when a diver leaves the surface to the time a diver begins their ascent to the surface measured in minutes.
Buddy system	A system by which two or more divers maintain contact in order that they may communicate and render assistance to one another.
Certificate of competence	A certificate issued by MBIE that authorises the holder to dive for reward in the workplace.
Combined Bottom time	The bottom time of more than one dive added together and treated as a single dive.
Current Line	A floating line trailing the support vessel to assist divers in currents.
DAS	Diving Activities Supervisor. A person qualified under NZUAs system as able to supervise divers from the surface.
Decompression diving	Diving which requires the use of decompression stops.
Decompression illness	A generic term for acute illness resulting when pathological consequences arise from decompression. This term includes both 'decompression sickness' and 'gas expansion injuries' of the lungs.
Decompression stop	The specified length of time a diver must spend at a specified depth, to allow for the elimination of sufficient inert gas from the body, to allow safe ascent to the next decompression stop or the surface.
Departmental Diving Officer	A person who is responsible for the day to day running of a University department's diving operations.
Direct supervision	Where a diver is within reach of another diver.
Dive	Time spent underwater or on the surface breathing through SCUBA, surface supplied breathing apparatus or a snorkel.
Dive Supervisor	A qualified person who supervisors dive operations at the dive site.
Diver	A person who performs SCUBA, SSBA or Snorkel diving.
Diving	The act of spending time underwater or on the surface (snorkeling) to achieve the objectives outlined in the dive plan.
Diving event	One or move dives that are related by purpose, place or time to form a series of dives.

Diving team	The group of people (dive supervisor, diver(s), and other personnel) who are present at the site, directly involved with the dive, responsible for the conduct of the diving operation, and the availability and conduct of emergency procedures.
Effective depth	For a dive at altitude, the depth of an equivalent dive at sea level.
Float Line	A buoyant line connecting the diver to a visible float on the surface of the water enabling the approximate location of the diver to be known at all times.
Full Scientific Diver	A diver who possesses a current Limited Certificate of Competency for Scientific diving through MBIE.
Improper diving conduct	Any behaviour that falls outside the University Diving Code of Practice or relevant legislation.
Lifeline	A line attached directly to a diver that is utilised for communication and capable of being used to retrieve the diver in case of emergency.
Medical clearance	A clearance issued by Diving Hyperbaric Medicine Services in accordance with the MBIE Guidelines for Occupation Diving.
MBIE	Ministry of Business, Innovation and Employment.
PADI	The Professional Association of Diving Instructors.
Provisional	A diver who is able to conduct dives for research purposes under the Scientific Diver direct supervision of a Full Scientific Diver.
Quick Release Mechanism	A reliable operating mechanism that enables the immediate release of a diver's equipment in a single operation with the use of one hand.
Recompression	A compression chamber used in the treatment of decompression chamber illness and other diving maladies which requires the use of decompression stops.
Reserve air supply	That quantity of air that will enable a diver to return safely to the surface from the planned depth of the dive, completing any planned safety stops.
Residual nitrogen	Nitrogen that is still dissolved in a diver's body tissues after the diver has surfaced.
Scientific diving	Diving performed for the purpose of professional scientific research, natural resource management or scientific research.
SCUBA	Self contained underwater breathing apparatus.

Shall	Indicates that a statement is mandatory.
Shot rope	A reference rope running vertically from the surface to an attached weight.
Should	Indicates a recommendation.
Student diver	A person enrolled as a student at the University of Otago undertaking diving activities in the course of their studies.
Surface interval	The time that a diver has spent on the surface following a dive, beginning as soon as the diver surfaces and ending upon commencement of the divers next descent.
University Diving Officer	The person appointed by the HOD Health and Safety to provide advice, support and training to DDO's and University divers to meet the University Diving Code of Practice relevant standards.
Visiting diver	Any person who is not an employee of the University of Otago nor a student at the University of Otago and is a trained and currently certified diver at another diving organisation, and is diving in association with the University of Otago.
Volunteer diver	Any person who is diving for or on behalf of any employee or student, or who is undertaking any diving on behalf of the University of Otago, and is receiving no payment.

APPENDIX 1: DIVING ENVIRONMENTS

TEMPERATE DIVING

Thermal protection should be worn in accordance with the temperature of the water. The following would be considered appropriate for diving in New Zealand and similar environments: 5mm two piece or semi-dry 5/7mm wetsuit with a hood (North Island) and 7mm two piece wetsuit or Drysuit with a hood (South Island, Stewart Island). In most instances gloves are also recommended for these temperatures. Care should be taken to keep warm between dives – wear a hat, drink warm liquid, minimize the chance of wind chill.

SUB-ANTARCTIC AND ANTARCTIC

Divers should refer to the Antarctic New Zealand Dive manual for information regarding diving in sub-zero and near zero conditions. Sub-Antarctic island sea surface temperatures range from around 4oC to 11oC. Temperature at depth can drop to just above zero.

Refer to Table 1: Approvals for diving for the approval process for such dives.

TROPICAL

Divers not familiar with diving in tropical conditions should consult the UDO, dive charter operations and others who have such experience. Particular areas of interest will be managing first aid of scraps and cuts from tropical marine invertebrates such as coral and jellyfish. Some dive operations recommend wearing stinger suits (lycra full body suits) in particular areas to prevent coelenterate stings. Other possible conditions to be aware of are blue water in which requires excellent buoyancy skills to maintain diver position in the water and plankton blooms which can cause zero visibility diving conditions.

OVERHEAD ENVIRONMENTS: ICE, WRECK, CAVE AND CAVERN DIVING

Divers must have specific endorsement on their dive check to be able to dive under Ice, in Caves and within wrecks. Divers will have training specific to such environments and show proof of such training and experience to the satisfaction of the University Dive Officer before endorsement will be given.

FIORD DIVING

Air temperatures in the Fiords can remain deceptively cool over the space of a day due to the high mountains and the low angle of the sun. Care should be taken to maintain diver warmth on the surface between dives.

The presence of a freshwater layer on the surface of the seawater in the Fiords results in a tannin stained blurry layer of water that is difficult to see through. During descents and ascents divers should stay close to their buddy and dive group due to the marked change in visibility through this layer.

Often diving in the Fiords involves diving on vertical walls and in clear visibility. These conditions introduce an additional hazard of runaway descents. Particular care should be paid to buoyancy control.

DIVING FROM ROCKY SHORES

The major hazards diving around rocky shores are the effect of surge due to swell on a diver particularly in shallow water. These hazards will be more noticeable on rocky promontories and areas exposed to prevailing seas and where a swell of more than half a meter is present. On the shorelines of rocky ridges and channels there can be a considerable rise and fall in swell heights.

Entry and exit points in particular should be carefully chosen to minismise the effect of white water due to surge on a diver. If there are no safe entry and exit points the dive shall be cancelled until conditions improve, or another method of access be used, such as diving from a boat.

With uneven terrain and slippery surfaces, scuba equipment should be put on as close to the water's edge as possible. The final movement to the entry point may need to be made by crawling until the water is deep enough to start swimming.

Entry points on sloping rocky shores should be chosen with rocky outcrops behind which divers can shelter from breaking waves. Divers should enter one at a time and swim beyond the surf zone before the buddy enters the water. Entry from a rock platform above the water should be made when a set of small waves occur. As the waves surge and reach their peak on the platform face, the diver should roll forward from a seated position into the water taking care to avoid any submerged rocks. The diver should swim beyond the surge zone as soon as the entry has been made.

Entry and exit from channels should be avoided whenever possible. If an entry is to be made it should occur when the channel surge reaches its maximum height so that the diver can swim out with the back surge. As successive waves move into the channel the diver should hold onto the rocks, submerge, letting the wave flow overhead, and swim with the backwash.

Once outside the surge zone the divers should make a final surface check before diving. As little time as possible should be spent on the surface since wave action will be greatest on or just below the surface.

When returning to the shore the divers should exit one at a time with the rest of the divers waiting outside the surge zone ready to give assistance.

On sloping rocky shores the diver should swim in on the swell, holding onto rocks during periods of backwash. When the water becomes too shallow to swim, the diver should keep his or her centre of gravity low by crawling until clear of the water. When exiting onto a rock platform or out of a channel, the diver should hold onto the wall as the surge reaches its peak and climb further with each upsurge until clear of the water.

Dive equipment should remain in place until the diver is well clear of the surge zone. Fins and mask in particular should not be removed prematurely.

DIVING FROM SANDY SHORES

Beach diving can be hazardous in heavy surf conditions. Entries and exits should be made from the least exposed section of the beach – if such a site exists.

While deciding on entry and exit points a check should be made on the surf pattern to establish if regular sets of smaller waves occur. Rip currents should also be identified. They are usually visible as a narrow band of reduced wave heights of more discoloured water than the surrounding sea. The presence and location of these currents on a beach will often vary from day to day.

The divers, fully geared up including fins, should wait at the water's edge for a set of smaller waves to form. They should walk backwards into the surf until the water is deep enough to swim out. A crouch position with the back to the waves and the mask held on the face should be used when waves break over the diver. If the diver is knocked over a crawl position should be used to reach deep water. Once it is deep enough to submerge the divers should swim beyond the surf zone staying as close to the bottom as possible.

As with all dives it is important for divers to take a compass bearing prior to entering the water. This will prevent the need for surfacing to re-orientate after entry. If however the divers are unsure of their orientation they can surface, reorientate themselves, check their equipment and their buddy and begin the dive.

Extra equipment should be towed out to ensure the diver does not become entangled, and when returning to the shore it should be allowed to stream in front of the diver.

Depending on the type of scientific equipment being used for data collection divers can carry it with them or tow it.

Rip currents should be avoided. If the diver is caught in one of these he or she should swim with it or at right angles to the flow, or float until the current disperses, move swim perpendicular to the current and then swim back to the exit point.

When returning to the shore the divers should surface beyond the surf zone and swim through it on the surface. On reaching water too shallow to swim the divers should crawl up the beach until well clear of the swell. Only then should they stand up or remove their equipment.

DIVING IN CURRENTS

Consideration of the tide times and heights is critical to form a good dive plan that minimizes the chance of exhaustion and maximizes the ability to complete the dives objectives.

Where currents are due to tidal influences (for example, at narrow entrances to large harbours) dives should be planned to coincide with slack water. Slack water does not necessarily occur at high or low tide. The relevant charts the LINZ website may give current speeds and slack water periods for the dive site

The direction of travel in a current dive will depend on the surface support available and the boat type. When diving with a tender vessel it is often most practical to swim with the current with the boat following your bubble trail and available to pick you up on surfacing.

If divers are diving without boat support (not recommended in medium to strong currents) it is always advisable to swim into the current and halfway through the dive time or air time complete a 180 degree turn to complete the remainder of the dive with the current stream. This minimizes the chance of exhaustion.

In currents of greater than one knot divers cannot effectively work up current for very long. If the current is less than one knot and the support vessel is anchored, the divers should swim into the current, surface upstream of the entry point, and float back towards it.

When dives are being made regularly in an area of strong currents, permanent jackstays or mechanical devices such as creepers should be used to assist the divers in moving about the work sites.

It is imperative that the surface watch remain vigilant throughout the dive. A strong current can force the divers to surface prematurely and can sweep them clear of the work area.

When the support vessel is anchored during a dive, the anchor line should be buoyed with a float. Should an emergency arise the anchor line can be jettisoned and retrieved later.

There should also be a buoyed line astern of the vessel so that divers swimming back to the boat can swim to the line if they miss the vessel.

Safety stops in slight to medium currents may require extra weight on the shot line.

Where decompression stops must be made in strong currents the stops should be made from the support vessel as it drifts with the current. If this is not satisfactory stops should be made on buoyed lines drifting with the current. These buoys must be large enough to take the weight of the divers and be as visible as possible. If more than one pair of divers is making a safety stop , several shot lines and buoys should be used. Prior planning must ensure the buoys and the support vessel remain as close together as possible.

DIVING IN LOW OR ZERO VISIBILITY

If the surface visibility is expected to decrease because of rain, fog or squally conditions, the divers should tow progress floats and be followed by a support vessel. When visibility is less than 1 metre horizontal or vertical diving should cease.

When diving in low visibility water in which visual contact is of difficult diver should consider using a life lines or buddy line.

Where possible shot lines and jackstays should be laid to assist the divers' orientation. If life lines or buddy lines are not suitable divers can apply to the UDO for approval to dive solo. Approval to dive solo is granted for a specific dive and a specified diver.

In zero visibility conditions, sonic devices is an advantage because they signal that a diver's air supply is low.

APPENDIX 2: DIVING ACTIVITIES

DIVING FROM BOATS

When deciding on the type and size of the support vessel consideration must be given to the environmental conditions and surface support needs, as well as the divers' requirements. A cockpit is recommended to provide shelter for the divers. Where guards are not fitted, the propeller must be stopped whenever divers enter or leave the vessel or when the position of a diver near the vessel is uncertain.

The vessel should be stable, buoyant and preferably have external hand holds close to the water.

Large Vessels should carry a diving tender if their manoeuvrability is poor, or access to and from the vessel for divers is difficult. The launching method for the tender must be safe and rapid.

Small Vessels (6 metres or less) should operate alone no further than maritime Rules Part 20 defining the Enclosed Water Limits, and the areas of the "Inshore limits" and the operating areas specified by the Safe Ship Management Plans. Operations outside harbours or estuaries may not be conducted in Dinghy-Class vessels. The Code of Practice for Operaitno of small vessels provides further detail Refer: otago.ac.nz/healthandsafety/policies_manuals_guidelines/codes/smallboat/index.html

An experienced skipper should be responsible for the vessel. The skipper should hold a Diving Activity Supervisor qualification or have equivalent knowledge, skills and experience as determined by the Dive Officer.

Divers must not linger near the surface when vessels are close by.

Where guards are not fitted, the propeller must be stopped whenever divers enter or leave the vessel or when the position of a diver near the vessel is uncertain.

Divers must not linger near the surface when vessels are close by.

Divers should be approached from downwind or down current whichever is stronger, particularly when using inflatables.

Divers should never enter the water from large vessels which are underway. If divers must enter the water when the vessel is underway, such as will occur on trawl dives, the entry should be made from a small tender.

This section assumes that divers are aware of the normal safety procedures for use of small boats such as seating, safe loading, stowage of dive gear etc and this will not be covered in detail here. All boat use must conform to the University of Otago vessel support safe operating plan.

It is the responsibility of the boat operator to ensure that the boat is anchored in an approved manner where applicable.

A dive flag MUST be flown at all times that divers are in the water.

After the boat is anchored or moored, and after divers have completed a safety check, divers should enter the water when instructed by the Dive Supervisor or boat operator. The tank pressure of each diver should be noted at this time. The boat operator must be advised of the dive plan and know where and when divers could be expected to be resurfacing.

Exiting the boat should be by the safest, easiest technique, usually by rolling backwards from smaller boats, stride entry off platforms, or by use of a ladder on large boats.

Once a diver has entered the water he or she should give the OK signal and swim away from the immediate area of entry and join with their buddy diver, especially when other divers are waiting to enter the water. Buddy divers may find it convenient to enter the water from opposite sides of the boat at the same time.

To assist divers who get behind the boat and cannot swim against the current it is advisable to have a 50-100m polypropylene line trailed from the stern with a highly visible float at the end. Divers caught behind the vessel can simply swim to the line and pull themselves or be pulled back.

Exiting the water should be done quickly and smoothly and generally by one diver at a time. Hand up any auxillary equipment, then weightbelt. On smaller boats it is often more convenient to remove tanks and compensators while in the water and pass these to a person in the boat. If this is not convenient than a rope with a snap shackle attached hanging off the boat is also a convenient place to attach gear, which can be retrieved once divers have left the water. Wherever possible a dive ladder or platform should hang into the water to assist entry and exit. Some divers prefer to take off fins before leaving the water on a ladder, others prefer to remove them in the boat. Divers waiting to exit should stay away from the ladder to avoid injury if a diver falls backwards.

Dive supervisors, skippers and others on board should pay particular attention to the needs of divers returning to the boat and boarding the boat as this is the time when most dive incidents occur. Once divers are aboard the Dive Supervisor, or if appropriate the boat operator should ascertain the diveprofile information from each diver including tank pressure, maximum depth and bottom time and enter this information on the dive roster.

Once all divers have returned to the vessel it may be necessary to have a roll call to check that everyone has returned, especially for larger diving parties.

SOLO DIVING

Solo diving is not accepted practice for scientific diving activities but there are occasions when it is necessary. Solo diving may be permitted in certain diving conditions and in exceptional circumstances and is at the discretion of the UDO.

For solo diving to be permitted, there must be:

1. 2-way communication between the diver and the surface
2. the diver is tethered to the surface
3. a stand-by diver ready to assist at immediate notice
4. A dive supervisor is present and in control of activities
5. a conservative dive pattern to compensate for the increased hazard to the diver.

Tendered divers can be signalled by underwater communications systems or rope signals.

LIFE LINE DIVING

1. Buddy lines and surface floats or life lines are recommended for use in low visibility conditions. Line diving is not recommended in areas where the line may become snagged on underwater obstacles
2. All life line dives require a surface stand-by diver ready to dive immediately at notice
3. Signals and procedures should be revised by the diving team and the surface support personnel before the diving operation begins
4. Lines should be checked for wear and tear before use. Care should be taken to ensure that life lines will run out smoothly during the dive
5. Before the diver enters the water the inboard end of the life line must be securely attached so that it cannot be lost overboard
6. The diver must be tied to the line by a bowline around the chest under any equipment which may be jettisoned or clipped on with a carabiner –type clip to a strong D-ring on a harness or compensating device. The life line must not be untied from either end until the diver has left the water
7. If using a jacket-type compensator, care must be taken to prevent entanglement with the buddy line when equipment is being ditched
8. The diver should descend feet first to minimise entanglement with the life line
9. Both the diver and stand-by must wear a knife
10. The attendant must keep the life line in hand at all times during the dive ensuring that the line is held tight enough to receive the diver's signal without unduly restricting the diver's movements

11. All life line signals must be acknowledged by the receiver. If the acknowledgment is not given, or is incorrect, the sender must repeat the signal until the correct acknowledgment is given. Float line signals are usually not acknowledged by the surface personnel.

LIFE LINE MARKINGS

1. Life lines should not be more than 50 metres and are recommended to be 8mm floating cordage
2. The line should be marked from the diver's end by a red band for every 15 metre length. Thus at 45 metres, 3 bands should occur
3. Each 15 metre length should be subdivided into 3 metre lengths by a yellow band for each multiple of 3 metres. Thus, the 21 metre length would be marked by 2 yellow bands placed 6 metres above one red band at 15 metres.

NIGHT DIVING

It is recommended that night dives should only be undertaken in areas of calm seas and nil or slight wind and current. A full moon and clear skies will assist the surface orientation of the divers and the support personnel.

The preparation for the dive should be completed during daylight and include a thorough gear check and an orientation dive on the site.

If diving in a harbour or an area regularly used by vessels the appropriate controlling authority should be contacted so that traffic in the area can be informed of the diving operation. Night diving in these areas should be avoided whenever possible.

Before diving commences the red-white-red diving signal should be illuminated.

However, in areas where no surface traffic occurs, a distinctive homing light may be used instead.

The gearing up area should be well lit.

The positioning of lights similar to leading lights in harbours will assist divers and surface support personnel to orientate themselves when travelling to and from the base and the descent and ascent points.

Each diver must carry two lights. A third light source (chemical glow stick or strobe), a whistle or other audible signaling device and luminous gauges should also be used.

The standard hand signals can be used at night by illuminating the hand with a torch. In addition to these signals, moving the torch rapidly up and down indicates that the diver needs assistance; moving the torch in a circle indicates that the diver is all right.

If the divers descend or ascend in open water they should do so on shot lines.

Where possible divers should swim along transect lines and, especially if not on transects, they should tow illuminated progress floats.

If using a support vessel it should show a distinctive light at all times to identify its position and carry an illuminated float, shot line and shot for use as a datum marker if required. Add two all around white lights (alpha lights).

On surfacing the divers must indicate their position (using torches and/or whistles), identify themselves to the surface support personnel and receive an acknowledgment. As whistling or shouting will not generally be heard over the noise of the support vessel's engine, the motor should be used sparingly. The divers must leave their torches on while on the surface to identify their position to the support vessel.

DEEP DIVES (DIVES FROM 18 TO 30 METRES)

There are particular hazards when deep diving because the narcotic effect of dissolved nitrogen can cause a loss of judgement, memory, sense of time and concentration. Procedures relying on these qualities should be minimised when planning deep dives. The dive plan should have a simple objective and include a procedure for a decompression stop.

The incidence of nitrogen narcosis will vary from individual to individual and from dive to dive; however, the effects usually decrease with subsequent dives. "Work up" dives should be made before deep dives are attempted. This procedure will reduce nitrogen narcosis sensitivity and it also increases diving fitness.

Accidents that reduce circulation (for example, a previous "bend" or recent heavy bruising) may make the diver more susceptible to decompression sickness on deep dives.

Carbon dioxide build-up increases the susceptibility to nitrogen narcosis. Breathing resistance due to the increased density of air at depth is a major contributor to carbon dioxide retention. Regulators with a high air flow capability, such as those with balanced first stages, are recommended for deep dives.

Compressed air may have excessive levels of carbon monoxide; indications range from an oily taste when breathed to persistent headaches after dives. Contaminated air shall not be used at anytime.

Heavy exertion underwater should be minimised. Suit compression at depth will increase exertion unless countered. The practice of removing 2 to 3 kilograms of weight to offset buoyancy loss is not recommended. The reduction of weight may reduce exertion at depth but it makes static decompression at shallow depths difficult. Suit compression should be countered by the use of a buoyancy compensator with an air inflation system.

Carbon dioxide build-up is likely when diving in currents and this should be avoided when deep diving. Orientation is a major problem especially if the diver has narcosis. Good visibility is important, especially when the diver is in midwater searching for the sea bed or surface.

Where possible the diver should ascend and descend on a vertical rock face or shot line. Good buoyancy around fine sediment slopes is important to minimize the effect of particles in the water on visibility. Shot lines or transects are strongly recommended for deep dives in reduced visibility. The diver must remain in contact with the line at all times when diving in these conditions.

In good visibility, diving on rock faces is preferable to dives on shot lines. Shot lines are often difficult to find when the diver begins an ascent, particularly if there is a current running or the diver moves out of the visibility range of the line. This becomes a potential problem if a chance factor causes the divers to overstay their time and they must decompress by necessity.

Rough surface conditions will make static decompression stops difficult. Therefore sea states greater than Beaufort Force 4 should be avoided when deep diving.

The dive profile should be conservative, preferably a direct descent to the greatest depth and the rest of the dive spent working back to the surface.

Gauges should be checked regularly during the dive. The divers must ensure that they stay shallower than the dive plan's maximum depth and have sufficient air for an 18 metre per minute ascent and a precautionary stop. It is strongly recommended that no change to the dive plan be made underwater to increase the depth or time of a deep dive. If severe signs or symptoms of narcosis occur underwater the divers must ascend immediately – the "work up" dive schedule should be repeated or modified until the narcotic effect is minimised.

Before the divers surface a saftey stop shall be made at 5 metres for 3 minutes. The surface support vessel should position itself over the ascent area. A lazy shot for decompression stops should be positioned amidships and marked at 3 metre intervals to a depth of 12 metres.

DIVING BELOW 30 METRE

All diving below 30 metres is restricted to contractors only and as per the Occupational Diving Guidelines for the type of diving being undertaken.

DIVING AROUND INTERNATIONAL PORTS

Diving round international ports engenders specific considerations in planning.

Divers will need to check the following aspects of the dive plan:

- Approval from the port authority
- A copy of the dive plan will be required by the port authority
- Consideration of shipping movement
- Documentation required by the port authority – such as driver's licences of the diving party including support staff

Skippers should call the port authority for clearance to begin the dive, upon entering the water and once the dive activity is completed and the divers are out of the water.

DIVING ON STRUCTURES

Diving on underwater structures requires a combination of special techniques that will vary considerably between structures and will be dependent on the diving exercise.

The three types of structures that will be most commonly dived on are bridges, wharves and dams.

The diving tasks may include inspections, underwater survey, searches, maintenance and recovery.

Diving around structures must be planned carefully as there may be various unknown debris that may trap or entangle a diver. In dams, the divers must be sure that water flows in tunnels, outlets and inlets are not changed while they are in the water. With respect to this aspect the correct procedures as outlined in The Supervisor's Checklist must be followed explicitly.

Structures may be located in fresh or salt water. Adjustment to buoyancy may be required and altitude and decompression requirements must be considered.

Strong currents often occur about bridges, wharves and dams, and while flows around dams can be regulated, divers must always be aware of the risk of being swept away. The currents about these structures are also responsible for transporting large quantities of fine sediment which may accumulate in the eddies around piles or in front of dams. Divers will quickly stir these up and cause the visibility to deteriorate. While the buddy system is best for safety, poor visibility may mean that 2 solo

divers are required. In these situations a single tethered diver may be used but the possibility of the diver's life line becoming tangled around debris must be considered. A diver-to-diver, diver-to-surface umbilical cord may enable good communications but also increases the chances of entanglement. Wireless underwater communication systems are available at considerable cost and provide divers with the freedom they are accustomed to. However an entangled or distressed diver using this equipment in low visibility without a life line will be difficult to find.

LIFTING OF OBJECTS

Should an object displacing more than 5 kg of water be raised, then a lift bag must be used. Divers should be trained in or experienced in using liftbags.

The lifting of heavy objects from the seabed can be a potentially hazardous exercise, especially if the diver is using either their BCD or drysuit to lift the object. If the diver was to let go of a heavy object while using their suit or BCD as a lifting device, then the diver could become extremely positively buoyant and rapidly rise to the surface. This rapid ascent can lead to a lung overinflation injury or even death. The falling object can also pose a significant risk to any other diver or equipment directly below.

POWER TOOL USE

Divers must hold an Occupational Certificate of Competency in the construction class to use power tools underwater (Refer Occupational Diving guidelines 2004).

FULL FACE MASK AND UNDERWATER COMMUNICATIONS

Specific approval is required as part of the dive check for divers to use Full face masks and underwater communications. Training with the University Dive Officer or equivalent training with another organisation is required prior to the dive check out skills being assessed (Refer Appendix 11).

DRYSUITS

Specific approval is required as part of the dive check for divers to use drysuits. Specific training in Proof of drysuit training covering the skills in the drysuit check out schedule and/or equivalent experience is required prior to the check out dive (Refer Appendix 11).

APPENDIX 3: EQUIPMENT

Guidelines for diving equipment are given in AS/NZS 2299:1:1999 Occupational diving operations, Part1: Standard operation practice.

The requirement for the use of safety equipment may vary with the diving conditions and the type of dive to be made.

APPENDIX 4: SCUBA DIVER'S EQUIPMENT CHECKLIST

- Mask, Snorkel, Fins
- Exposure protection: Wetsuit, Drysuit (undergarments, second LPI inflator), Hood, Gloves, booties – appropriate for conditions
- Weight system – weightbelt, weights, harness, integrated weight pockets etc
- Bouyancy compensating device
- Scuba tanks
- Regulator with two second stages
- *Timer –watch, bottom timer
- *Depth gauge
- *Submersible pressure gauge
- An air integrated computer may fulfill the functions of the above three items.
- Compass
- DCIEM Dive decompression tables (waterproofed)
- Signalling device – audible and/or visible (safety sausage)
- Knife, Shears
- Logbook – hard copy of last ten dives
- Torch (as required)
- Slate (as required)
- Spares kit – o-rings, batteries, straps, mouth piece, cable ties etc

APPENDIX 5: SCUBA EQUIPMENT MAINTENANCE CHECKLIST

At the end of each day's diving the equipment should be washed in freshwater. Commercial detergents to clean dive gear are available from your local dive shop. Drying and storage should be in a cool dry area where air can circulate. Silicon spray will increase the durability of rubber parts, but should not be sprayed on rubber in contact with buckles or the second stage of the regulator. The following specific checks should be made during the washing procedure, thus allowing maximum time for repairs or replacement.

MASK

- stretch the rubber strap and look for cracks, especially around the buckle
- check that the glass plate sealing ring is secure
- if a purge valve is present check that it has not perished.

SNORKEL

- check that the mouthpiece is firmly attached to the tube
- check the mouth grips for wear.

FINS

- check for cracks in the heel strap, around the toe pocket and the blade
- ensure the buckle of the fin strap is secure.

EXPOSURE SUIT

- The suit should be stored flat or hung on a broad coat hanger. Repairs to cuts and seam splits should be made as soon as possible
- check that the zips move freely, lubricate with silicon spray
- in particular check the armpits, crotch and knees for abrasions and cuts
- do not put heavy equipment on the suit
- lubricate the inflation/deflation valves and seals in dry suits with silicon spray.

BUOYANCY COMPENSATING DEVICE

- Servicing of the BCD should be done at least annually by a qualified servicing technician. There may be times when the BCD requires more frequent servicing for repairs or if it is not inflating/deflating efficiently
- The compensator should be rinsed inside and out and stored partially inflated
- check and lubricate the inflation/deflation system
- pressure relief valve.

KNIFE

- check the sheath for cracks, especially at the top of the pocket
- that the locking device or retaining ring and the straps are not perished
- check the blade for rust, especially where the blade joins the handle
- that it is sharp.

GAUGES

- All mechanical gauges have delicate mechanisms that must be protected from severe knocks. Pressure gauges and decompression meters should not be carried in unpressurised aircraft without protection
- Gauges must be serviced according to the manufacturer's service specifications at least annually. Depth gauges with reading errors greater than +2.5 percent or pressure gauges with errors greater than +5 percent must be repaired before use Gauges with calibration errors should not be used unless the error is clearly marked on the face
- Gauges with any rusting or flooding must not be used
- Computers should have sufficient battery life for the dive event.

LIGHTS

- standard dry cell batteries should not be stored in torches
- if the bulb is dark or has grey areas it should be replaced
- nickel cadmium batteries should be fully discharged before recharging
- stretch the O rings while looking for cracks. Lubricate the ring lightly with silicon grease.

BACKPACK

- check the back support is not cracked
- ensure that the locking device
- on the waist and shoulder straps locks and works freely
- the tank band is secure, and check that the wing nuts and screws attaching the band to the back support are also secure.

SCUBA CYLINDERS

- All scuba cylinders must be hydrostated every 2 years
- All cylinders must receive an internal visual inspection annually
- When storing the cylinder for several months it should be placed upright and have 700kPa (l00psi) air pressure
- check the cylinder's hydrostat date or the inspection tag
- check the O ring for cracks
- check that the tap turns on and off smoothly and closes the air off without undue force
- the cylinder boot should be removed every 6 months and the base cleaned
- If any of the following 3 checks reveal defects the cylinder will require at least a visual internal inspection
- check the valve orifice for signs of contamination, using the regulator filter checks below
- turn the valve on and watch for a fine white mist (water vapour) and smell the air for a damp metallic odour
- shake the cylinder when empty and listen for sloshing of water or the rattle of rust chips.

REGULATOR

- Servicing of regulators must be done at least annually or when specific items such as breathing effort increases or water contamination is suspected, to the manufacturer's service specifications
- Look at the first stage filter. The regulator should be overhauled when the filter changes from a grey colour to:
  - red (indicates rust in a steel tank)
  - green (indicates salt water corrosion)
  - black (indicates carbon from the compressor filter or other impurities)
- Where red and black discolouration occurs or when specific items such as breathing effort increases or water contamination is suspected, the cylinder should also be checked
- Regulators should be stored flat with the dust cap firmly in place. The first stage filter orifice must be sealed during washing to ensure that there is no water seepage. Do not depress second stage purge button
- Air and water leaks must be repaired promptly. Checks for leaks can be made by inhaling through the second stage when the dust cap is in place or by watching for air bubbles underwater. Air leaks are most likely from the first stage piston rings or the hose swivel joint on the second stage. Water leaks rarely occur in the second stage. Exhaust valves folding in and split mouth pieces are more likely to create leaks
- Dust caps should be screwed down over the filter orifice as soon as the regulator is taken from the tank. Dust caps with O rings are recommended (check the
- O ring is present). Caps with hollow centres, or the rubber ball type are not recommended
- Check the hose for cuts or bubbles under the rubber, especially where the hose bends when used. Hose sleeves at the first stage end are recommended
- Check the mouthpiece, as detailed for the snorkel earlier.

WEIGHT SYSTEM

- Weight belt in good condition
- Release working
- Correct amount of weight for fresh or salt water
- Integrated pockets – clip fastens, weights do not move around in pocket.

APPENDIX 6: RECOMMENDED EQUIPMENT FOR DIVE BOATS

(Asterisks indicate non-essential items for vessels less than 6 metres in length.)

- Anchor and warp suitable for conditions – buoyed anchor line
- Shot line marked at 3 and 6 metres
- Storage for diving gear – preferably bottle racks
- Sufficient area to kit up
- First aid equipment including oxygen resuscitation equipment and first aid manual
- Depth sounder
- Radio telephone – emergency procedure table beside it
- Charts and tide tables
- Recall device – surface and underwater.
- Datum marker line and shot, illuminated if used for night diving
- Buoyed stern line Dive flag
- Night diving lights
- Ladder for ease of access to and from water extra Set of scuba gear
- Binoculars
- Spotlight for night diving
- Personnel – skipper – knows what to do should a diving emergency arise
  – surface watch and/or stand-by diver
- Life jackets
- Cold and wet weather clothing

APPENDIX 7: LIFE LINE SIGNALS

PULLS AND BELLS

Signals comprise either pulls or bells or a combination of both. A pull is a steady single heave on the line. A bell is a sharp tug, always given in pairs as with a ship's bell. i.e. five bells is given as: two quick tugs pause with two quick tugs pause one quick tug.

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

SIGNALS FROM ATTENDANT TO DIVER

PULL	To call attention – are you all right?

Note: All the following signals from attendant to diver must be preceded by one pull (to call attention).

PULLS	Am sending down the rope' s end (or as previously arranged).
PULLS	You have come up too far. Go down slowly until stopped.
PULLS	Come up.
4 PULLS *followed by*	
2 BELLS.	Come up – hurry up.

DIRECTION SIGNALS

1 PULL	Search where you are
2 Bells	Go to the end of the distance line, jackstay or lifeline
3 Bells	Face shot lifeline then go right
4 Bells	Face shot line then go left
5 Bells	Come into your shot or turn back if on jackstay

FROM DIVER TO ATTENDANT

PULL	To call attention. Made bottom, reached end of jackstay.
PULLS	Send me down a rope's end (or as previously arranged).
PULLS	I am going down again.
PULLS	May I come up?
PULLS *followed by*	
2 BELLS.	I want to come up, assist me up.
Succession of PULLS	EMERGENCY SIGNAL
Succession of 2 BELLS	I am fouled and need the assistance of another diver.
Succession of 3 BELLS	I am fouled but can clear myself if left alone.

WORKING SIGNALS

PULL	Hold on.
BELLS	Pull up.
BELLS	Lower.
BELLS	Take up slack life line, you are holding me too tight.
BELLS	Have found/started/completed work.

APPENDIX 8: DIVE PLAN CONTENTS

1. Event Title
2. Event Leader
3. Dates and Estimated Number of Days Diving
4. Location of Diving
5. Site Description
6. Personnel
   a. Name
   b. Diving qualifications
   c. Diving Role
   d. Emergency Contact/ Telephone
   e. Relationship
   f. Medical and OSH expiry date
   g. Date of last first aid course
7. Vessels
8. General Description of Activities
9. Proposed dive profile(s)
10. Diving Logistics
11. Evacuation Plan
12. Nearest Operational Recompression Chamber
13. Nearest Hospital
14. Hazard Identification
    a. Decompression Sickness (DCS)
    b. Gas Management
    c. Nitrogen Narcosis
    d. Pulmonary or CNS (02) Toxicity
    e. Hypothermia
    f. Tidal and Wind Driven Currents
    g. Low Underwater Visibility
    h. Hazardous Marine Animals
    i. Entanglement
    j. Altitude Diving
    k. Diving In Contaminated Waters
    l. Seasickness
    m. Fire
    n. Weather Conditions
    o. Flying or Driving to Altitude after Diving
15. Emergency Equipment And Communications
16. Metphone
17. Diving Program And Logistics Approved By
18. Signature
19. Date

APPENDIX 9: CHECKLIST OF FIRST AID PROCEDURES IN SUSPECTED BAROTRAUMA AND/OR DECOMPRESSION SICKNESS

- Remove the diver's equipment, including the wet suit
- Open the airway, check that the diver is breathing and if breathing has stopped begin mouth-to-mouth resuscitation with two rescue breaths. If the patient is breathing check whether the breathing is normal or shallow. Shallow breathing may be serious and commonly occurs where a victim is in shock
- Continue with CPR at a rate of 2 breaths to 30 compressions for an adult
- Enact emergency assistance plan – call for assistance and continue first aid as per current protocols and your training.

Where possible observation of signs and symptoms should be recorded as they may assist emergency personnel on their arrival

- Observe the rise and fall of the chest. Do both sides move evenly?
- Is there pain in the chest, particularly on deep inspiration! If there is pain does it occur at a specific site (eg., under the sternum)?
- Can you hear any obstructions to breathing? Is there a voice change?
- Look at the mucous membranes inside the mouth and lips. Are they dark blue? The colour of the skin and fingernails is not a reliable indicator when looking for signs of cyanosis in the diving situation.

CARDIOVASCULAR SYSTEM

- Check the carotid pulse in the neck: the normal pulse rate is 60-80 beats per minute. The radial pulse on the wrist is not a reliable indicator in the diving situation
- Is the pulse strong, weak, or absent? Shock victims usually have a rapid weak pulse. If you cannot feel the pulse in the carotid artery, put your ear to the chest of the victim and listen for the heart beat.

CENTRAL NERVOUS SYSTEM

- Check the conscious state of the victim. This ranges from confusion and drowsiness to total unconsciousness. Do they respond to voice, pain, or neither. The diver's response to a painful stimulus - such as a tap on the collar bone will assist in this assessment
- Can the patient clearly see a finger held in front of his or her eyes or is it blurred?
- Move the finger from side to side - do the patients eyes follow the movement?
- Are there any blind spots or tunnel vision?

- Check that the limbs function normally – can the patient move the toes and fingers, ankles and wrists?
- Check the muscle tone of the limbs is normal by having the patient push each leg and arm against your hand
- Is there tingling or numbness in the limbs?
- Can the patient feel your touch? Is it the same on one side of the body as the other and on various parts of the body?
- Check the plantar reflex by scratching – for example, with a pen on the sole of the left foot from heel to toe. If the big toe moves up and the other toes spread out, brain damage may have occurred
- Is the skin discoloured or does it have a measle-like rash, particularly on the thighs and upper part of the body?
- Does the skin surface at the base of the neck "crackle" when touched?
- Are there skin itches particularly on the thighs, arms, hands, nose, or ears?
- Bluish mottling or large red swellings may indicate severe decompression sickness symptoms.

BACKGROUND INFORMATION TO ACCOMPANY DIVER TO THE PHYSICIAN

- Personal information – name, address, contact phone number, emergency contact information
- How long and to what depth was the diver down?
- Had other dives been made in the previous 12 hours and if so, to what depth and for how long?
- Was a decompression stop (precautionary or necessary) taken before surfacing?
- If so, at what depth and for how long?
- What was the purpose of the dive?
- Did it involve hard physical effort?
- Did anything abnormal occur during the dive?
- Did the diver show any abnormal reactions?
- Did the divers have the necessary equipment for the dive – especially safety equipment?
- Did this equipment malfunction at all?
- Did the diver free ascend, or ascend, faster than 18 metres per minute? Check the diver's pressure gauge.

- Had the diver suffered a recent illness?
- Had the diver received an injury just before, during, or after the dive?
- Had the diver been suffering from pain (particularly in the joints or back), headaches, fatigue, insomnia, or seasickness?
- Had the diver been taking medication or drugs before the dive?
- Had the diver been drinking alcohol?
- When was the diver's last meal?
- Had the diver been doing heavy exercise after the dive?
- What is the name and location of the diver's personal physician?

A diver with decompression sickness should never be recompressed underwater but should be passed onto to emergency personnel to refer to Diving Hyperbaric Medicine Services for treatment as indicated.

TRANSPORTING DECOMPRESSION OR BAROTRAUMA PATIENT

If the diver is to be transported to a recompression chamber the priority is to minimise the time between the onset of the symptoms and recompression - this is especially so for barotrauma victims. Contacting diver emergency Services or the closest medical facility as soon as possible will enable quick activation of services that can assist and arrange the safest and quickest transportation method depending on the location.

The best evacuation method is to use a portable chamber large enough for the diver and an attendant, with sufficient breathing gas and a coupling for transfer under pressure to the treatment chamber. In most locations a chamber transportable by air would be the safest and swiftest evacuation procedure.

However, where no chamber is available air transport may not be the safest method. The lower cabin pressure in most aircraft may produce a further deterioration in the patient's condition.

Helicopters have the advantages of speed at low altitudes and of not requiring a landing strip – provided that a suitable route exists. There is some evidence to suggest that patients' symptoms will worsen as a result of helicopter transport due to the increased vibration promoting bubble formation.

Road transport will often be the easiest and the fastest method, especially if the patient is within 3 hours drive of the chamber.

Consideration must be made in any dive plan for the transportation of a victim.

APPENDIX 10: DECOMPRESSION TABLES AND COMPUTERS

Recommended practice is:

- Avoid no decompression limits (NDLs)
- Ascend slowly (< 18 m per minute maximum, preferably slower)
- Make successive dives to shallower depths
- Make a safety stop at 5 m for 3 mins, for every dive deeper than 10 m
- Wait until well over the surface interval before commencing repetitive dives
- Because a period of longer than 24 hours may be required to eliminate excess gas from the body, it is recommended that a break of one day in every two or three days be made in a period of repeat diving.

The DCIEM tables have been developed since 1962. They are regarded by most diving authorities in New Zealand as the safest tables available and have been adopted by many research organisations world-wide. You are required to use the DCIEM tables when diving under the requirements of this COP.

It is recommended that every diver purchase a copy of the DCIEM tables on a waterproof plastic sheet.

Diving Computers are submersible gauges which combine a clock and pressure transducer with an electronic microprocessor programmed with a decompression model. Dive computers generally provide current information on depth and time. Other information displayed can be: surface interval, ceiling level, decompression stop times, ascent rate and ascent rate warning, temperature, time to fly and more. During the dive however, the diver needs to be able to see current depth, maximum depth and elapsed time.

Computers can be used for recording dive data but that the DCIEM tables are to be used for all dive plan calculations.

APPENDIX 11: CHECK OUT DIVE REQUIREMENTS

CHECK OUT REQUIREMENTS - SCUBA

1. Assemble gear
2. Pre dive safety check
3. Water entry
4. Descent
5. Clear mask
6. Remove and replace mask
7. Retrieve lost regulator
8. Remove and replace SCUBA unit on the surface
9. Maintain neutral buoyancy
10. Alternate air source ascent
11. Tired diver tow
12. Any other specific skill the University Dive Officer considers necessary taking into account the proposed nature of the diving to be carried out by the diver.

DRYSUITS

Divers intending to dive in drysuits will be asked to complete the following skills in addition to those listed above:

1. Emergency arrest of runaway ascent
2. Emergency disconnect of inflator valve.

FULL FACE MASKS AND UNDERWATER COMMUNICATIONS

Divers intending to dive using full face masks and underwater wireless communications will be asked to complete the following skills in addition to those listed above:

A knowledge quiz based on use of the OTS full face mask and the Buddy underwater communications system.

Practical skills assessment:

1. Adjusts and dons OTS full face mask including nose plugs
2. Checks communication between divers and the surface support
3. Conducts descent using correct equalization procedure
4. Conducts MRT test underwater as receiver and transmitter
5. Demonstrates proper use of regulator
6. Clear partially and fully flooded mask
7. Removes and replaces fully flooded mask
8. Removes flooded mask and breathes from alternate air source, replaces spare mask.
9. Simulates out of air scenario, removing mask, using AAS and spare mask, swims with buddy to the surface
10. Demonstrates proper ascent.

The following specialist diving types and equipment uses require specific endorsement by the Dive Officer on the dive check: Ice diving, Overhead environments (wreck penetration, caves and caverns), Use of power tools, Full face masks and UW communications, Solo diving.

CHECK OUT REQUIREMENTS - SNORKELING

1. Assemble gear
2. Pre-dive safety check
3. Water entry
4. 50m surface fin
5. Clear mask
6. Clear snorkel – blast
7. Clear snorkel – expansion
8. Duck dive and equalization
9. Cramp removal
10. Tired diver tow

APPENDIX 12: GUIDELINES FOR INTERACTING WITH WILDLIFE IN THE MARINE ENVIRONMENT DURING OTAGO UNIVERSITY FIELD ACTIVITIES.

These guidelines are presented as suggestions for staff and students of Otago University as precautions that will assist in minimising the risk associated with interactions between humans and wildlife in the marine environment. They apply to staff and students on or in the marine environment and also those working on shorelines.

Most animal interaction whilst diving or snorkelling will be with Hooker's sea lions and New Zealand fur seals. There is a potential for interactions with sharks in some areas.

GENERAL

Responding in a calm manner is important when approached by or interacting with marine life. Sudden movements and loud noises should be avoided. In most cases simply ignoring the animal will result in the animal leaving the area.

Risks of injury from interactions with marine life should be considered and appropriate actions taken to mitigate those risks on the field/dive plan.

SHARK INTERACTIONS

Location	Avoid being in the ocean in and around pinniped colonies. For example: Titi Islands, Rugged Islands, Nuggets, Subantarctic islands, Shag Point shoreline
Time of day	Avoid being in the water at dusk or dawn
Time of year	Some sharks are known to migrate. White sharks arrive in Stewart Island around October and leave about April, but some clearly stay until July or even through the winter. Breeding season could be avoided. The time of year that seal pups first get in the water in the area should be avoided.
Other activities	Fishing should only be conducted where it is required to collect samples. Limit fishing before and after diving trips. No recreational fishing or spearfishing is allowed during University diving/ snorkeling trips. Take care managing fishing of any kind. Fish should get to the boat independent of people. Using a floatline that trails the diver or snorkeler is a good idea. All scuba divers require a buddy in the water so if fishing as part of their research they will need to ensure the fishing activity is safe for their buddy and that all risks of that activity are weighed up and appropriate actions taken to mitigate the risk to their buddy. During this activity the buddy could be appointed as a lookout diver.

Swimming	Limit surface swims as much as possible and if these are necessary stay in a group. Minimise noise and water movement especially at the surface. Skippers to try to keep boats right by divers, or go pick them up.
Exit/Enter water	Drop off and pick up divers as close to walls and the shoreline as is safe. Dive profiles that work from walls and reefs are best. Avoid mid- water ascent. Dive supervisors should stay alert and calm. The dive group should keep together as much as possible.
Safety stops	Avoid dive plans that call for mid-water safety stops. Where these stops are important to minimize the risk of DCS divers should do these stops in a group and close as is safe to the shoreline or on the boat anchor or other line. Ensure the skipper is aware of this during the dive planning stage and the dive briefing.
Abort dive	All people in the dive party should understand the diver recall system and respond accordingly if it is used. Any diver at any time can confidently say 'no' to a dive or call off a dive without fear of repercussion.
Technology	Several systems have been researched to provide divers with information of the efficacy of these products. For peer reviewed research on the effectiveness of Shark Shields read Huveneers, Rogers, Semmens, Beckman, Kock, Pageworth, Goldsworthy, 2012. Effects of Shark Shieldtm electric deterrent on the behaviour of white sharks (*Carcharodon carcharias*). Final report to Safework Australia. Version 2. South Australian Research and Development Institute (Aquatic sciences), Adelaide. Marine Environment and Ecology. Shark shields have been purchased and are available through the department of marine science. If worn by one diver, they should be worn by all in a party. Using a shark shield attached to the boat ladder may be effective in minimizing interactions.

A summary of the risk of shark interaction world-wide is available on the website of the Florida Museum of Natural history: flmnh.ufl.edu/fish/sharks/statistics/trends.htm

APPENDIX 13: DIVE PLAN TEMPLATE

UNIVERSITY OF OTAGO DIVE PLAN

Event title		Dive supervisor		Vessel	
Date		General location		Dive site	

Dive site description

General dive logistics

DIVE EVENT PERSONNEL

Full name	Dive quals	Diving role	Emergency contact name and phone	Medical expiry date	First aid expiry date

DIVE PLANS: Complete plan & submit to either DDO or UDO as per COP timeframes.

First dive plan					Second dive plan			
Depth (m)	BT (mins)	PG	SI	RF	Depth	BT	PG	SI (mins)

Third dive plan					Fourth dive plan		
Rep factor	Depth (m)	BT (mins)	PG	SI	RF	Depth	BT (mins)	PG

RISK ANALYSIS

Description of risk	Liklihood H/M/L	Impact H/M/L	What are we doing about it? (Eliminate, idolate, minimise) high risk high impacts must be eliminated
e.g. Cold	H	M	Wearing 7mm suits, hood, hats on boat, warm drinks

EMERGENCY ASSISTANCE PLAN

Evacuation plan: How will a patient be evacuated from the dive site?

Communications: How will you contact emergency services? (eg cellphone, sat phone, VHF)

Nearest operational recompression chamber: Location and contact details

Emergency equipment you are taking: First aid and oxygen, other? Please include reference numbers for equipment where relevant

Dive leader signature	Dive trip and activity approved by:	Date

APPENDIX 14: DIVE PLAN ROSTER

UNIVERSITY OF OTAGO DIVE LOG

Dive supervisor to complete as day progresses, scan and send to DDO within 7 days of end of trip.

WEATHER FORECAST ON THE DAY

High tide time		High tide height	
Wind direction		Wind strength	
Swell height		Swell direction	

ACTUAL WEATHER AT SITE

	Swell height	Swell direction	Wind direction	Wind strength
Dive 1				
Dive 2				
Dive 3				
Dive 4				

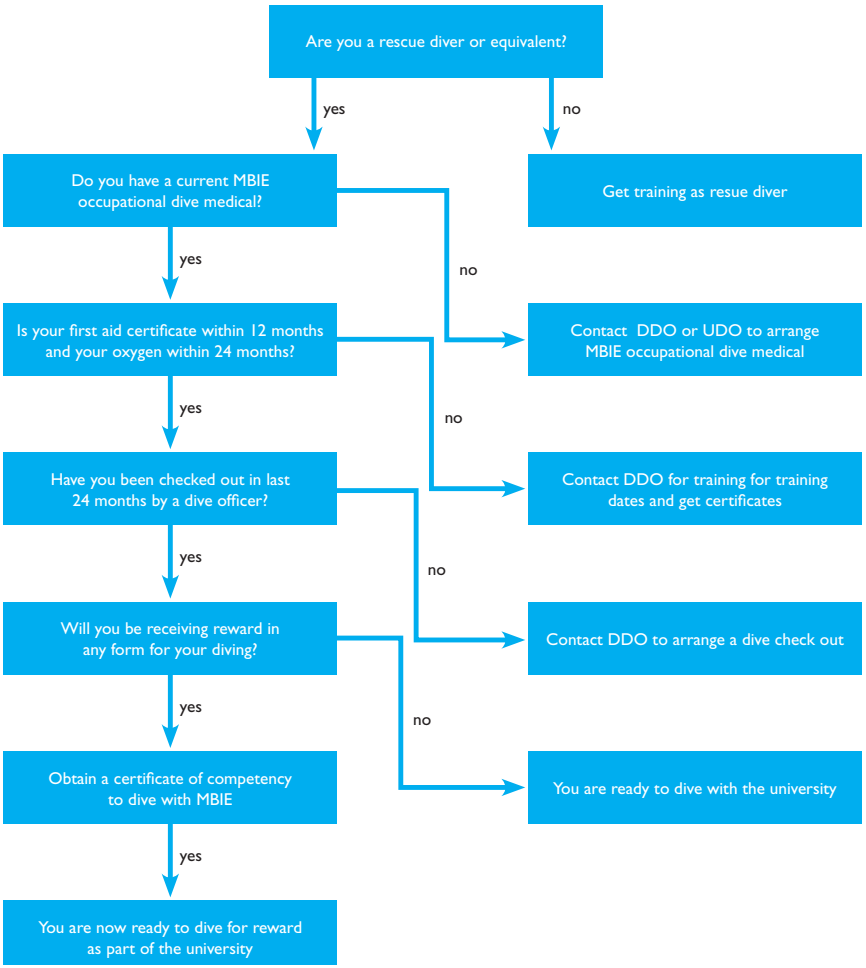
DIVE LOG — First dive: Location _____ — Second dive: Location _____

Full name	Depth (m)	BT (mins)	Air in	Air out	Depth (m)	BT (mins)	Air in	Air out	Initial

DIVE LOG — First dive: Location _____ — Second dive: Location _____

Full name	Depth (m)	BT (mins)	Air in	Air out	Depth (m)	BT (mins)	Air in	Air out	Initial

APPENDIX 15: TO BE AUTHORISED TO SCUBA DIVE



APPENDIX 16: TO BE AUTHORISED TO SNORKEL DIVE