

UNIVERSITY OF WALES, BANGOR

Diving Rules

These rules are based on those prepared by Dr Rohan Holt for the Joint Nature Conservation Committee and Countryside Agencies. I am very grateful to Rohan for allowing the University of Wales Bangor to modify these rules for our own diving activities.

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1 Summary

These Diving Rules have been issued to comply with the Diving at Work Regulations 1997 (DWR 97), issued by the Health and Safety Executive (HSE), which came into force on 1 April 1998. In order to comply with the law practically all diving activities within UWB should follow the Scientific and Archaeological Approved Code of Practice (ACoP). Non-scientific diving work, such as installing and maintaining moorings, not covered by the Scientific and Archaeological ACoP, may be carried out by complying with the guidelines set by the Commercial inland/inshore ACoP. Switching between ACoPs is possible providing diving personnel are suitably qualified.

The DWR 97 apply to all employed and contract staff who dive as part of their work for UWB in Britain and abroad and to students and short-term volunteers who may receive expenses or are even paid in kind specifically for diving.

1.1 Necessary course of events for carrying out Diving Projects

1. The Vice Chancellor (in effect usually the Academic Registrar and Secretary) registers as the named **Diving Contractor** with HSE (Section 3.1). Occasionally, a scientist may select a Diving Contractor outside the organisation (eg when working with another institution/company). In this way UWB are acting as a **Client** (Section 3.9) and the following tasks are handled by people outside the organisation.
2. The Diving Contractor nominates **Diving Project Managers** in Schools, Departments or Centres within the University in writing to carry out the duties of the Diving Contractor (apart from nominating Diving Supervisors). The Diving Project Manager must produce a **Diving Project Plan** (a form of risk assessment) for each Diving Project (Sections 3.3 and 5).

The **Diving Project Plan** must identify the **Diving Supervisor(s)** (Section 3.6) who will be in immediate control and oversee each **Diving Operation** (Section 3.4). The Diving Project Plan must also identify the **composition of the team** (Section 4), the **Divers** involved (Section 3.2) and that the whole dive team is **suitably qualified** to carry out its task (see Section 3.7.1). The Dive Plan must also give details of anticipated **target depths, environmental conditions, decompression schedules** to be used and **plans for the evacuation of a casualty** in the event of an accident (see examples in Appendix 1).

3. The Diving Contractor has to give generic approval to **Diving Supervisors** in writing (can be done at the same time as item 2 if appropriate) before the Diving Project Manager can appoint them to act in this role on specific Diving Projects.

The Diving Supervisor is not permitted to dive whilst acting in this capacity, although he/she may hand over this duty to another Diving Supervisor in order to do so. A Diving Supervisor must be on duty for the entire period of the Diving Operation; this period generally ends six hours after the last divers out of the water return to atmospheric pressure (Section 3.6.1).

4. In Britain, on each day of the Diving Operation(s) the first Diving Supervisor on duty contacts the coastguard to inform them of the intended plan. This may not always be possible overseas, where a coastguard may not be available. The Diving Supervisor keeps records of times and depths etc. of each dive in the Operations Log and notes any **changes to the Diving Project Plan in the daily risk assessments** section. The Diving Supervisor may swap over duties with one of the Divers once he/she has safely concluded the first Diving Operation (this is also recorded in the Operations Log).

5. The Diving Project Manager collates all the Operations Logs (and any incident reports) at the end of the Diving Project (or after each set of Diving Operations on lengthy Diving Projects) and sends copies to the agency's Diving Officer.

1.2 Important considerations

- **Mixed professional and amateur dive teams** can be accommodated under the Regulations. Risk assessments must be carried out to consider the competencies of all divers involved (Sections 3.7.2 and 3.8).
- All diving operations must be planned and executed according to the schedules laid down by an approved **decompression table or decompression computer** (Section 6).
- A two-way means of **communication** between the Supervisor and the divers should be provided (Section 7).
- **Diving records**, including The Dive Plan, the Operations Log and Personal Dive Logs must be kept for a minimum of two years (Section 9).
- Divers must carry an **independent alternative air supply**, a device to achieve **positive buoyancy** and some way of monitoring decompression requirements (tables, watch and depth gauge and/or decompression computer). All equipment used must be maintained in a safe working condition and records of maintenance kept (Section 11).
- **No dives** will be carried out **deeper than 50 m** below sea level (Section 5.3).
- **First aid** and **oxygen administration** equipment must be readily available at the site of all Diving Operations and at least one person in the surface support team must be qualified in first aid and oxygen administration (Section 10.2).

2 Introduction

These diving rules are drafted from a combination of the following documents:

- The Health and Safety Executive's *Scientific and Archaeological Diving Projects Approved Code of Practice* (ACoP)
- *Diving at Work Regulations* 1997 (DWR 97)
- Scientific Diving Supervisory Committee's *Advice notes for the scientific and archaeological approved code of practice* (1998)

2.1 Aims of the diving rules

The aim of these rules is to guide any personnel involved with diving activities in UWB Schools, Departments and Centres through the process of running Diving Projects safely while at the same time complying with the law set out in the DWR 97. These rules are intended to be goal setting, as are the DWR 97 and ACoP on which they are based, although there are a few safety issues which must be strictly complied with. However, it should not be assumed that compliance with these diving regulations means that all aspects of the law are being complied with. The requirements of other legislation may also need to be fulfilled. These diving regulations may also be considered as a generic risk assessment so that unnecessary repetition is avoided when compiling risk assessments for specific Diving Project Plans (Section 5.3). For additional information copies of the above documents are available through the Diving Officer.

2.2 Legal requirements

These diving rules have been issued to comply with the DWR 97 issued by the Health and Safety Executive which came into force on 1st April 1998. DWR 97 replace the Diving Operations at Work Regulations 1981 and all their subsequent amendments. The DWR 97 seek to control the hazards and risks associated with diving. They are goal setting, allowing the employer to plan and manage the work to protect the health and safety of everyone taking part as far as it is 'reasonably practical'.

2.3 Definitions used in the regulations

Throughout these rules the University of Wales, Bangor is hereafter referred to as "UWB.

Italicised text indicates sections extracted directly from the DWR 97 and ACoP; **bold type** is used to emphasise important procedures.

3 Organisation of personnel involved in diving / definition of roles

3.1 Diving Contractor

The term "Diving Contractor" refers to a named person in UWB, or person under a contractual agreement to undertake diving work on behalf of UWB, who has registered in that role with the HSE.

Registration with the HSE is a legal requirement; renewal of registration is required only if the Diving Contractor's details change (e.g. when a new person takes over the role or the organisation changes address).

The Diving Contractor has overall responsibility for each Diving Project and therefore, in complex organisations such as universities, this task must be carried out by a senior member of staff (Chancellor / Vice Chancellor) who carries ultimate responsibility for the safety of his/her staff. However, it is likely that the named Diving Contractor in each organisation will have neither the time nor the detailed knowledge required to formulate Diving Project Plans. Therefore some of the duties of the Diving Contractor can be handed over to staff in Schools, Departments and Centres who have a deeper understanding of the Diving Projects and diving matters in general. In UWB, these are referred to as **"Diving Project Managers"**.

3.2 Diving Project Manager

The Diving Contractor in each organisation will need to nominate one or more Diving Project Managers in writing (suitably qualified personnel can be identified by the Diving Safety Officer). However, the duty to formally nominate **Diving Supervisors** remains personal to the Diving Contractor (a legal requirement). Diving Project Managers will therefore have to put forward a list of potential Diving Supervisors (practically all staff divers in UWB will need to act as Diving Supervisor at some time) for the Diving Contractor to appoint in writing. This can be done on a one-off basis, so that the Diving Project Managers may pick Diving Supervisors from a pool of personnel approved by the Diving Contractor.

Lists of nominated Diving Project Managers and approved Diving Supervisors will be held by the Diving Officer.

Responsibilities of the Diving Project Manager include:

- i assessing risks, and ensuring that a Diving Project Plan is prepared;*
- ii ensuring the dive team is aware of the Dive Project Plan;*
- iii ensuring that there are suitable and sufficient divers who are competent in both diving and the actual work to be undertaken, such as the use of scientific equipment;*
- iv ensuring that the place from which the diving is to be carried out is suitable and safe*
- v providing sufficient and suitable plant and equipment, and ensuring that it is correctly certified and maintained;*
- vi ensuring that adequate arrangements exist for first aid and medical treatment;*
- vii ensuring that Diving Project records are kept;*
- viii ensuring that all other relevant regulations are complied with*

The Diving Project Manager must ensure that copies of the Diving Project Plan are handed to the Diving Contractor before the Diving Project take place.

3.3 Diving Safety Officer.

Although this position has no meaning or direct reference in DWR 97 almost all scientific and archaeological diving units have such a post. In UWB the Diving Safety Officer's main roles are to provide advice to the Diving Contractors and Diving Project Managers, monitor and maintain diving standards, identify needs for and help organise training, keep a centralised record of diving qualifications and activities and update the Diving Rules as required. The Diving Safety Officer may also direct Diving Projects, although will require authorisation from the relevant Diving Contractor to do so.

UWB's appointed Diving Safety Officer is Dr John R Turner, School of Ocean Sciences.

3.4 Diving Supervisor

A Diving Supervisor is the person appointed to be in **immediate** control of all diving related activities, in and out of the water, at the site of a Diving Operation and available to implement emergency procedures as necessary. Where two or more boats are being used, or where diving is taking place at separate sites, which are not within close verbal communicating distance, there must be a Diving Supervisor in each boat or at each site.

A Diving Supervisor need not be an in date Diver (Section 3.7.1) but should have sufficient training or experience in the operational and safety techniques which are to be used for that particular operation. A Diving Supervisor need not have an in-date medical but should be a qualified first-aider and have had training in therapeutic oxygen administration.

3.4.1 Period of supervision

A Diving Supervisor must be on duty for the entire period of the Diving Operation during which time the Diving Supervisor should not leave the dive site or dive without first handing over to another Diving Supervisor. The hand-over should be entered in the Diving Operation record.

The duty of Diving Supervisor finishes when it may be reasonably anticipated that the divers will not require therapeutic recompression.

For SCUBA divers, this period can be considered to end **six hours after the divers return to atmospheric pressure.** When provision is made for Diving Supervisors to change over during a Diving Operation, the last Diving Supervisor appointed will remain on duty for the final six hour period. That person should ensure that the divers are aware that they are to remain under supervision for six hours after their return to atmospheric pressure. In practice there are circumstances, such as when divers return home in the evening, when some means of keeping in contact with their Diving Supervisor should be available (e.g. by telephone) in case symptoms of a diving related illness appear after leaving the dive site.

3.4.2 Responsibilities of a Diving Supervisor

The responsibilities of the Diving Supervisor have some features in common with those of the Diving Contractor / Diving Project Manager, although the Diving Supervisor must be on site and has the last say before the divers get in the water. His/her responsibilities include:

- i. checking the Divers are competent to dive and can carry out the work underwater;
- ii. ensuring that everyone in the Diving Operation is aware of the Diving Project Plan, and that the Plan is kept up to date;
- iii. maintaining proper records of the Diving Operation;
- iv. ensuring that there is adequate communication with the divers in the water;
- v. checking the site on the day of the dive, and when conditions change, confirming that the risk assessment is still current;
- vi. checking that the diving equipment provided is appropriate and adequate for the project.

3.5 Diver

The term ‘Diver’ means a person at work who dives, whether as an employee or as a self employed person. There is nothing in the DWR 97 that prevents scientific dive teams being made up of a mix of both people who are at work and people who are not. If anyone who is not at work is allocated duties under the DWR 97 he or she must be competent to perform these. The DWR 97 require that before the start of a Diving Project a risk assessment is performed and a Diving Project Plan is produced that addresses any identified risks. Managing a mixed team is a type of risk that needs to be planned for. See Section 3.7 for qualifications and responsibilities.

3.6 Diving Project

‘Diving Project’ is the term used for the overall diving job – whether it lasts two hours or two years. It can be made up of one or more Diving Operations. A number of Diving Projects could take place on one site at the same time. Each of these Diving Projects could be separate from the others, and each could have a separate Diving Project Manager in charge. The Diving Project will finish when the Diving Project Manager has ensured that every diver has been safely recompressed. A Diving Project Plan and risk assessment has to be written by the Diving Project Manager and approved by the Diving Contractor before any Diving Operation takes place (Section 5).

3.7 Diving Operation

‘Diving Operations’ can be made up of either a number of dives or, sometimes a single dive. A Diving Operation should be that portion of a Diving Project which one Diving Supervisor can safely supervise. A Diving Supervisor must be appointed by the Diving Project Manager for each Diving Operation from the pool of approved personnel.

3.8 Divers’ requirements

Section 3.4 specifies those divers to whom the Regulations apply.

3.8.1 Qualifications of divers

Each Diver must have been approved by the Diving Project Manager (with advice from the Diving Officer if required) prior to undertaking any Diving Operation.

Divers have a number of responsibilities under DWR 97. These include:

- i. holding an approved qualification for diving;*
- ii. being competent to work safely;*
- iii. hold a valid certificate of medical fitness;*
- iv. complying with the directions of the Diving Supervisor and the Diving Project Plan;*
- v. maintain a daily record of their dives which they should keep for at least two years.*

The following are approved training certificates:

- A Part IV (or greater) Certificate of Training issued by the HSE.
- Diving experience under the DOWR (1981) exemption DOW/1/81.
- A British Sub-Aqua Club (BSAC) Advanced Diver (previously 2nd Class) qualification, a Scottish Sub-Aqua Club (SSAC) 2nd Class Diver qualification.
- 3-star qualification from the Confederation Mondiale des Activites Subaquatiques (CMAS).
- CMAS 3-star equivalent in a recreational agency / organisation whose qualifications are approved by HSE for the class of Recreational Diving.
- European Scientific Diver (ESD) – SCUBA only.
- Advanced European Scientific Diver (AESD) – SCUBA only.

All HSE parts certificates issued under the Diving Operations at Work Regulations 1981 remain legally valid and do not have to be exchanged for the new certificates.

3.8.2 Volunteer and Student divers

Volunteer and Student Divers should have the BSAC Dive Leader qualification, or a grade equivalent to CMAS 2 star, although the BSAC Sports Diver qualification may be acceptable, at the discretion of the Diving Project Manager, if backed by sufficient and recent diving experience (SDSC advice notes). These qualifications must be currently validated, including an in-date medical, in the Volunteer Diver's logbook. Current membership of a diving organisation will also be required by Volunteer Divers for their third party diving insurance.

The Diving Project Plan should show that a Volunteer or Student Diver is diving with the team and include an outline of their qualifications and anticipated role.

UWB staff cannot take part in UWB work-related diving activities as volunteers 'in their own time' (e.g. on annual leave, at weekends or in the evening outside working hours). If a UWB diver takes part in a UWB Diving Project then that diver must be considered to be at work irrespective of when that dive is taking place. This is to ensure that all UWB diving, for whatever purpose, is conducted according to DWR 97 with an appropriate Diving Project Plan under the control of a Diving Contractor / Diving Project Manager and Diving Supervisor.

3.9 Work involving amateur diving groups

If UWB supports a totally amateur group by providing reasonable expenses (such as providing kit, paying travel and subsistence, paying for fuel or the hire of a boat) but UWB staff do not dive themselves, then the divers in that group are **not** at work and are not covered by DWR 97. However, it is strongly recommended that anyone dealing with such a volunteer group ensures that all the divers taking part can fulfil the 'spirit' of these Diving Rules by ensuring that:

- i. all the divers are suitably qualified to undertake the intended task and have in-date medicals;
- ii. the task itself is reasonably achievable without putting anyone at unnecessary risk;
- iii. all the divers in the group are affiliated to a recognised diving organisation (such as BSAC) and have third party liability insurance cover for diving;
- iv. there is someone of sufficient experience (CMAS 3* or equivalent or higher) in charge of the group.

A letter from the leader of the volunteer group confirming the above details should be sufficient to satisfy the above recommendation.

However, the circumstances and status of that group may change if a member of UWB staff joins them to dive (see Section 3.10).

3.10 Diving with amateur and student groups

If a fully qualified diver, employed or contracted by UWB to dive during an ‘amateur’ event, joins such a group, then **the part of the group who comprise that diver’s ‘support team’** (i.e. a minimum of a Diving Supervisor and the diver’s buddy) **must comply with the DWR 97**. Diving Project Plans and risk assessments must be prepared by the UWB diver (who will have to take on the role of Diving Project Manager – Sections 3.1 and 3.2) prior to diving and the amateur divers be made fully aware of their responsibilities.

The Diving Project Manager must be satisfied that Volunteer and Student Divers are competent to carry out the tasks involved with the dive.

3.11 UWB staff diving with external contractors

Contractors who organise and run diving projects for UWB (see also Section 3.12) have to act as Diving Contractor for that particular Diving Project. They are therefore responsible for the safety of the dive team including anyone who joins that team from UWB. If using divers from UWB they should also adopt this set of diving rules as a basis to their Diving Project Plan and risk assessment.

3.12 Clients and others

The ACoP warns that *actions or omissions of other people can affect the safety of the dive team even though these people are not members of the team. These people include:*

- i. The **Client**, who has the responsibility of selecting a diving contractor to perform the project. This responsibility means that the Client should make his or her selection on grounds of how the diving contractor proposes to comply with the Diving Regulations and the diving contractor’s plans for a safe system of work, as well as the many other factors that the client should consider when making his or her selection. While the duties of the Client under this regulation do not extend to checking the quality of the Diving Contractor’s risk assessment or Diving Project Plan, a Client, before engaging a Diving Contractor, should establish basic details of how the Diving Contractor will go about this task. It is essential that adequate resources are allocated to the Diving Contractor to enable him or her to perform the Diving Contractor’s duties under the Diving Regulations.*

In practice it may be more straight forward if the person acting as Client within UWB asks to see the contractor’s Diving Project Plan. A copy of the Plan should be passed to the Diving Officer if there is any doubt about its contents.

- ii. Site owners and charitable trusts should pass on relevant information to the Diving Contractor they engage. They should consider whether any underwater or above water hazard could be a risk to the safety of the divers. They should also ensure that other activities in the vicinity do not affect the safety of the diving project.*
- iii. Vessel operators should ensure that any equipment under their control does not adversely affect the safety of the diving project. They should keep the supervisor informed of any changes in circumstances which may effect the safety of the diving project, and co-operate with the diving contractor to enable his or her obligations under the Regulations to be fulfilled.*
- iv. The duty under this Regulation also extends to Diving Contractors, Supervisors, Divers and to people indirectly involved in the diving project, such as crane operators, lorry drivers, and maintenance personnel. These people should ensure that their tasks and the way they undertake them does not effect the safety of the dive team.*

3.13 Additional training for diving with other than SCUBA-air

When any equipment other than self-contained, open circuit, air diving equipment is used, the Diver, stand-by diver and Diving Supervisor should have suitable training approved by the Diving Science and Archaeological Advisory Committee (DSAAC). Nitrox and trimix diving require specific qualification in their use although courses are now available through a number of training schools. Rebreathers need specific training in their use and this should be endorsed by the manufacturer. Nitrox (otherwise known as oxygen enriched air or EANx), using SCUBA or other systems, has been shown to significantly enhance safety margins with respect to decompression illness. Its use should be encouraged providing that all its pros and cons are thoroughly understood through appropriate training (the Diving Officer can provide information on request).

3.14 Fitness of Divers

Each UWB Diver will be medically examined and passed fit to dive by a doctor approved by the Health and Safety Executive, or if diving outside Britain, by a doctor approved by the Occupational Health and Safety Unit. This certificate must be reviewed every 12 months or following any accident or illness which might prevent diving. Where a medical is carried out less than a month before the expiry of the current medical certificate, the start of the new certificate may begin from the expiry date of the current certificate.

Volunteer and Student Divers must have a valid certificate of medical fitness as required by their recreational diving organisation.

It is the duty of the Diver to inform the Diving Supervisor if he or she is unfit to dive. If the Diving Supervisor considers a person to be unfit to dive, he/she can instruct that person not to dive.

3.15 Guidance for Divers who dive infrequently

The Advice notes for the Scientific and Archaeological Approved Code of Practice recommend an 'in date' system be maintained for all research divers. As Divers vary considerably in their ability to dive and amount of previous experience, this system is included here as a guide, rather than as a rigid system to be adhered to.

Any Diver is deemed to be ready for a working dive if, within the last month, he has undertaken a working dive, or a dive with a simulated task of work, to at least 20 metres for at least 20 minutes.

If the Diver lapses from in-date readiness, then the following table of work-up dives can be applied. These dives should be assumed to be the minimum required, and if the Diving Officer or Diving Project Manager has any reservations as to the fitness of any Diver then the series should be extended or repeated.

Time Lapse.	Working Depth.		
	10 metres.	10-30 metres.	> 30 metres.
1-2 months.		10 metres.	20 metres. 30 metres.
2-12 months.	10 metres.	10 metres. 20 metres. Working depth	10 metres. 20 metres. 30 metres. Working depth
> 12 months.	Pool test/Rescue training. 10 metres.	Pool test/Rescue training. 10 metres. 20 metres. Working depth	Pool test/Rescue training. 10 metres. 2 X 20 metres 2 X 30 metres Working depth

Note: All divers in UWB, whether diving regularly or not, should periodically revise their safety and rescue skills. It is recommended that all divers attend a training event each year, prior to the commencement of the ‘diving season’, with emphasis on in-water rescue techniques, rescue management, first aid and oxygen administration.

4 Conduct of diving

4.1 Composition of the diving team

DWR 97 regulation 6(3)(a) states that *‘the Diving Contractor shall ensure that there are sufficient people with sufficient competence to carry out safely and without risk to health both the Diving Project and any action (including the giving of first-aid) which may be necessary in the event of a reasonably foreseeable emergency connected with the Diving Project’*.

The minimum team size in benign conditions – reasonably clear water, no tide or current, no trapping hazard, easy access to and exit from the dive site, the task to be performed is not arduous and where the dive team is familiar with the dive site - can be three for SCUBA operations – Diving Supervisor and two divers who act as standby for each other. However, in less ideal conditions, particularly in unfamiliar waters, dive teams should comprise four divers – a Diving Supervisor, a second person to act as surface support and two divers who act as standby for each other. The number of divers in the team should be included in the Diving Project Plan.

See Section 3.8.2 for mixed dive teams comprising amateur and professional divers.

4.2 Standby divers

For each Diver whilst diving, there will be another diver, the Standby Diver, who shall be in immediate readiness to dive to render assistance in an emergency. When two divers are in the water at the same time and who are near enough to be able to communicate with, and render assistance to, each other in an emergency (i.e. roped, or in sight contact) each may be regarded as the standby for the other.

For dives deeper than 30 m and dives involving planned decompression, divers must be paired and in close contact. It is also recommended that an additional standby diver is present on the surface.

Paired divers must remain in contact at all times. If separated, divers must ascend and regroup on the surface.

The Diving Supervisor must ensure that the Standby Diver(s) has sufficient no-stop/no decompression penalty time at the operating depth to enable them to give assistance to the working Diver(s) without incurring decompression problems.

The Diving Supervisor shall not be the Standby Diver

5 Diving Project Plans and risk assessments

5.1 Dive Planning

The Diving Project Manager must produce a Diving Project Plan before the commencement of the Diving Project in accordance with Regulation 7. Copies must be made available to each Diving Supervisor, Diver and the agencies' Diving Contractor. The Diving Project Plan shall be based on an assessment of the risks to the health and safety of any person taking part in the Diving Project and shall consist of all such information and instructions as are necessary to give advice to and to regulate the behaviour of those so taking part. See example given in Appendix 1.

All Diving Projects should have a site and date specific risk assessment, although some of these details cannot be assessed until on site at the intended time of the dive (Section 5.2 and Appendix 2).

The risk assessment should cover all of the normal risks involved with diving and methods to control the risks although need not repeat information presented in these Diving Rules. The Diving Project Plan must include at least the following information:-

- i. *The Diving Contractor and Diving Project Manager (named).*
- ii. *The number/names of Diving Supervisors required.*
- iii. *The number/names of Divers required.*
- iv. *The number/names of other personnel required and their duties.*
- v. *The equipment required.*
- vi. *Any special competencies required from any personnel.*
- vii. *The general risk assessment, including :-*
 - *sea conditions anticipated,*
 - *underwater visibility,*
 - *pollution,*
 - *depth,*
 - *temperature,*
 - *access,*
 - *breathing gas,*
 - *in-water and surface communications requirements,*
 - *emergency procedures such as recompression chamber access,*
 - *medical expertise,*
 - *medical equipment,*
 - *casualty evacuation plan,*

In addition, there must be prior consultation with, and effective means of communication with, all persons having control of information related to the safety of the Diving Operation (coastguard, harbourmaster).

Hard copies of the Diving Project Plan and the Diving Operations Risk Assessments must be kept for at least two years after the completion of the Project/Operation.

5.2 Daily planning

The Diving Project Plan must be flexible enough to allow for contingencies to be built in in case of changes in conditions. Risks specific to the day's diving, that are not covered by the Dive Plan (see Appendix 1), should be considered and noted in writing by either the Diving Project Manager or the first Diving Supervisor on duty (there is space given for this purpose on the Diving Operations log sheet – see Appendix 2).

The following points should be considered when planning a series of Diving Operations. A series is defined as all dives completed from the time when a Diver first leaves atmospheric pressure to the time when the Diver's body tissues return to a desaturated state (12-16 hours following the last dive). It should be noted that an overnight period may be insufficient to achieve desaturation.

- i. It is advisable that whenever possible the deepest planned dive of a series should be completed **first**, successive dives becoming shallower.
- ii. It is recommended that a **maximum** of three dives be carried out in any 24 hour period (mainly because the ascents from depth are considered provocative with respect to decompression illness). A greater number of dives may be considered if the risks involved are thoroughly explored and considered acceptable – for example when a diver is required to do more than three very short dives to retrieve samples from the seabed in shallow water. In such cases the Diving Project Manager must include an assessment of the risks in the Diving Project Plan.
- iii. There should be a **minimum** surface interval of two hours between each dive (the maximum rate of micro-bubble formation in the Diver's body is thought to occur at approximately one and a half hours after surfacing). If divers return to the surface prematurely due to diver separation or equipment malfunction, the dive may be continued as soon as practicable but within 15 minutes; this break in the dive should be noted in the dive log.
- iv. Each diver should have a continuous **24 hour period free from diving** once a week, usually **the 7th day after 6 days continuous diving**.
- v. Divers should avoid strenuous or provocative post dive activities (e.g. hauling the boat's anchor or moving to altitude), which can induce bubble formation in the Diver's body, for approximately two hours following any dive.

5.2.1 Note on the use of nitrox

The use of **Nitrox** (see Section 3.13) as the Divers main breathing gas can significantly reduce the dangers associated with decompression illness. Shorter surface intervals, a greater number of ascents and longer dive times (at less than 30 m) than suggested in paragraphs i to v above, without compromising safety, are possible using an appropriate mixture of Nitrox. Further information on Nitrox training and its use can be obtained from the Diving Officer.

5.3 Depth limit for working dives

No dives will be carried out deeper than 50 m below sea level.

When diving at altitude, in fresh water, the actual depth plus appropriate depth penalty for altitude must not exceed 50 m.

6 Decompression tables and electronic diving computers

All Diving Operations must be planned and executed according to the schedules laid down by an approved decompression table (six have been approved by the SDSC including the BSAC/RNPL; BSAC '88 and SAA/Buhlmann – see the SDSC Advice Notes) or by an approved electronic decompression computer. Computers which have a facility to download dive profile information to p.c. should be used whenever possible. The Diving Officer can provide information on decompression computers not covered by the general recommendations in Section 6.3.

6.1 Stage decompression stops

Planned Diving Operations which require stage decompression stops of more than 20 minutes will not be carried out (unless a decompression chamber is on site).

In any 24 hour period, only **one** dive schedule which involves a planned stage decompression stop will be permitted.

In practice, dives carried out for the UWB should rarely involve depths below 30 m or extend beyond no-stop times. Diving below 30 m and/or the use of decompression stops must be very carefully planned beforehand with preparation including a number of suitable 'work up' dives and the details of any **intended or possible decompression requirements** included in the Diving Project Plan.

6.2 Ascents

All ascents, even only a couple of meters, may induce the formation of gas bubbles in the body. Divers should:

- i. Avoid multiple ascents to the surface
- ii. Avoid 'saw-tooth' dive profiles, that is a profile with multiple excursions from a shallow to deeper depth.
- iii. Not exceed the recommended maximum ascent rate for the decompression table/electronic dive computer in use.
- iv. Plan the dive time of a No-stop dive to fall at least 2 minutes within the No-Stop time.
 - v. For all dives deeper than 10 m, perform a safety decompression stop at 3-6 m for at least 1 minute. If, at the end of the dive, the diver has spent more than one minute working at a depth less than 7 m the safety stop is not required.
- vi. The dangers associated with ascending to the surface from depth can be reduced by using Nitrox (see Sections 3.13 and 5.2)

6.3 Electronic decompression computers

6.3.1 Introduction to electronic decompression computers

The use of decompression computers is becoming more widespread, particularly as the technology supporting both the hardware and software is continually being updated. They can significantly increase the amount of time a diver can stay underwater, while at the same time reduce the risk of decompression illness by adopting a variable profile decompression schedule.

6.3.2 Approved decompression computers

It must, however, be noted that despite the growing use and development of these dive computers and their good safety record, concern still exists about the reliability of some of the earlier models under certain conditions of use, for example, during multiple dives, in adverse working conditions or during rapid ascents. Thus the use of these older models by the staff, students and volunteers in UWB is now discouraged.

General approval is given to computers which have the following features:

- i. Display actual depth and maximum depth at the same time.
- ii. Multi-tissue monitoring (i.e. take account of a range of 'slow' and 'fast' tissues).
- iii. Simultaneously display dive time and time remaining until decompression stops are required (no-stop time).
- iv. Measure changes in barometric pressure and are capable of adjusting the no-stop times accordingly (i.e. can take account of diving at altitude or unusually low barometric pressure at sea level).
- v. Ascent rate warning (audible or visual).
- vi. Pre-dive look up facility to aid dive planning (time to 'desaturate' is also desirable).
- vii. If the no-stop time is exceeded they should display decompression requirements such as duration of stop at certain depth or time required until reaching surface.
- viii. Log book facility.
- ix. Switch on automatically when immersed (rather than having a manual on/off switch).
- x. Download of dive profile information to p.c. facility.
- xi. Battery life sufficient for the duration of a series of dives where desaturation times are likely to exceed the interval between dives.
- xii. Although not a general requirement some computers are now available which incorporate a facility to monitor cylinder pressure and hence integrate air consumption rates with the no-stop time at whatever depth the diver is at. This is certainly an advantage if 'deep' diving is planned although such computers are usually more expensive than the non air-integrated models. There are also computers that are designed to cope with the diver using nitrox or even several different mixes of gas during the same dive.

Mechanical decompression meters must not be used.

6.3.3 Procedures for the use of electronic decompression computers

For all diving with any make or model of decompression computers it is recommended that the following procedures be followed.

- i. Divers must be familiar with the instructions and operating procedures for their meters, especially the maximum safe **ascent rate** and any recommendations to complete **safety decompression stops**.
- ii. When decompression computers are being used to carry out a series of multiple dives over a day or longer period, each diver must have a decompression computer for their **exclusive use**.
- iii. During such a series of dives, divers must not transfer between different decompression computers, or between a decompression computer and decompression tables, until their desaturation time or 24 hours has elapsed (whichever is longer).

- iv. Dive planning is a legal requirement of work diving; Divers and Diving Supervisors should agree on a surfacing time after which an emergency will be deemed to exist. An approximate dive profile should be reviewed carefully to ensure an adequate supply of breathing gas will be available to complete the dive plus an adequate reserve in the event of an emergency.
- v. When carrying out paired diving, dive planning and in-water procedures (e.g. termination of the dive) must be determined using the most conservative no-stop limits indicated by either decompression computer.
- vi. When only one decompression computer is in use between a pair of divers, the other diver must have a depth gauge, watch and set of decompression tables and **the pair must observe the no-stop and decompression limits of the most conservative of the two decompression schedules.** (This insures against the possibility of the pair of divers becoming separated, or breakdown of the meter). Note that no-stop times given by diving computers are normally shorter for square-profile dives than those given by tables. A single roped diver with decompression computer should also be equipped to use decompression tables as a back-up. In the event of an equipment failure, divers should ascend immediately at the prescribed rate completing any safety decompression stops. Diving beyond 20 m using a shared decompression computer is not recommended.
- vii. A diver should not dive for at least 24 hours before activating a decompression computer to use it for the first time. Similarly, if changing the batteries on a computer results in it losing data on the most recent of a series of dives it should not be used and the next dive aborted if the next dive falls within the desaturation period given by that computer (see ix). In cases where the desaturation time is not known a period of at least 24 hours should be allowed to elapse before the next dive.
- viii. It is advisable that the Diving Supervisor and Diver should record in the dive log the desaturation time, when this is provided by the decompression computer, upon completion of the dive. In the event of instrument failure through damage, accidental switching off or loss of battery power, this record can be used to determine the time at which the diver may resume diving on an alternative decompression schedule.
- ix. Since several of the earlier models and cheaper current decompression computers in use give no details of length of decompression required once the no-stop time is exceeded, decompression schedules cannot be planned and divers may be unable to assess whether they have sufficient air to complete their stops. Such machines must not be used for decompression diving.
- x. Where the machine permits, dive profiles should be recorded.
- xi. Where a dive is to a depth greater than 10 m, divers should complete a safety decompression stop at 3-6 m for a minimum of one minute, or longer if recommended by the manufacturer. This precaution is unnecessary where the diver has already spent more than one minute at a depth less than 7 m.
- xii. In the event that divers work up to, or over their no-stop limits, their dive profile, particularly the final ascent phase must be very carefully controlled and the slowest ascent rate recommended by the relevant manual used. Where a safety stop is completed this should be recorded.
- xiii. If the rapid ascent warning indicator remains on after surfacing indicating an abnormal ascent, this must be treated as a potential problem and recorded as such in the Diving Operations record and in the Diver's personal logbook. The Diving Supervisor must assess the severity of the situation and act accordingly.

- xiv. The recommended precautions regarding repetitive dives (duration of surface intervals etc.) should be followed as in Section 5.2.
- xv. If there is any doubt at all about the safety of the dive which might be carried out using the profile recommended by the decompression computer, or any doubt about the experience of the Divers and their ability to use the instruments reliably, then the dive must be carried out using decompression tables.

7 Communication with the surface

7.1 Voice communications

The ACoP recommends that *a two-way means of communication between the Supervisor and the divers should be provided. Voice communication with tape recording facilities should be available for all dives and only dispensed with if the findings of the risk assessment state that it would be safe to dive without it.*

Whatever communication system is used (voice communications, lifelines, surface marker buoys or otherwise), the type and the reason for the selection needs to be addressed in the Diving Project Plan (see Section 5.1).

The decision to use or not use voice communications equipment must be made by whoever is in control of the Diving Operation and is responsible for assessing the risks at the time (normally the Diving Project Manager and/or the Diving Supervisor). Not all circumstances can be considered here although as a guide voice communications should be used when:

- Diving in situations where any ropes and lines to the surface are deemed hazardous (therefore use through-water voice communications).
- Diving in very poor visibility when hand signals between Divers cannot be seen.
- The Diver's task requires accurate and rapid communication to the surface support team which cannot be transmitted adequately via rope signals. For example, when the boat crew is moving a heavy object, such as a remote camera, across the seabed with guidance from the Diver.

Recent developments in through-water communication systems will allow divers to communicate with the surface and with each other at the same time without the encumbrance of diver-to-diver or diver-to-surface cables. Many of the commercial systems use 'full' face masks, although 'mouth masks' containing a microphone are now available which allow the Diver to use a normal 'half' face masks and swap mouth pieces to use their emergency air supply.

7.2 Surface marker buoys and lifelines

For diving in nearshore rocky areas involving swimming away from a boat, working in kelp, or when drift diving (*i.e.* much of the diving carried out in UWB), a heavy lifeline/hard wired communications system could itself cause problems. In such cases a lighter line on a reel with a surface marker buoy (SMB) attached should be used so that the surface support team can see the position of and maintain contact with the divers. When diving on overhanging underwater cliff faces, wrecks or in tunnels and caves (*i.e.* no 'clear surface'), or descending a shot line, particularly when there is a current, delayed SMBs may be carried instead and deployed once the obstacle has been past to indicate the diver's whereabouts. There are instances when the dive is conducted on a small underwater feature which the divers can follow from surface to seabed and back to surface, which is well known to the divers, in no current and good conditions (eg diving on overhanging cliffs in Lough Hyne). In such situations, a line and marker buoy is not necessary (since it is additional equipment which can cause further hazards

such as entanglement) provided that the dive plan requires the divers to stay on the pre-determined feature, and that there is negligible chance of the divers drifting away from the feature.

A SMB line should be sufficiently strong such that in an emergency, a diver could be lifted to the surface by pulling on it. For paired diving, divers must be in close contact at all times if only one diver of the pair is attached to a lifeline. In poor visibility paired divers should be attached via a buddy line.

If any sort of line between the diver and the surface is not practical or safe then voice communications should be used (see above).

It is recommended that where underwater visibility falls below 1 m and where the divers cannot maintain station on the seabed, the conditions are unsuitable for the dive.

7.3 Attracting attention on the surface

If there is any risk of divers being unexpectedly moved away from their intended position, for example when diving in strong tidal streams (even if diving at slack water at tide-swept sites), all divers should carry some means of attracting the attention of the surface support crew in addition to their surface marker buoy. Visible signals such as extendible safety flags, inflatable delayed SMBs (which can be inflated and sent up on a line from below the surface) and personal flares can be used to attract attention from a distance. Sound signals such as whistles can be used if the diver is out of line of site of the surface support (see also night diving below).

7.4 Night diving

During night diving, each diver must carry a torch (and a spare) to facilitate underwater navigation and to indicate position when on the surface. In addition there must be a light at the surface visible throughout 360°. The Diving Supervisor should standardise a simple set of surface torch signals with the divers to indicate 'all's well' or that a problem has occurred.

If night diving from a boat, the boat should have adequate illumination at the surface both for location by divers and appropriate navigation lights to satisfy the International Regulations for the Prevention of Collisions at Sea 1972.

8 Diving from the shore

When diving takes place from the shore with no boat cover available, the following precautions should be taken:

- i. There must be an easy point of entry and exit to and from the water. Consider how the divers get back on shore if the exit point is likely to be different from the entry point.
- ii. The shore party must be able to follow divers along the coast and to leave to fetch help if necessary. Two people are therefore required in the shore party with transport available to reach nearest telephone in an emergency.
- iii. The location of the nearest telephone (or whether a mobile phone will have an adequate signal) must be known to the diving Supervisor.
- iv. All safety equipment should be available on the shore: VHF radios, first aid kit, oxygen administration equipment.

Telephone numbers for coastguard, nearest doctors, and hospital should be available (on the Diving Project Plan). In an emergency and/or when recompression facilities are required, dial 999 for the Coastguard.

9 Recording and maintaining diving data

The DWR 97 Regulations require the Diving Supervisor and each Diver to maintain a log of all Diving Operations; the details required are outlined below (as in the SDSC Advice Notes). These records must be maintained for a minimum of two years and must be shown to the HSE on request.

It is possible to use data stored on a diving computer providing it can be transferred to a suitable storage media (electronic or paper) and ratified by the Diving Supervisor as being accurate and reflecting the information contained in the Diving Operation record.

9.1 Diving Operations log

During diving, the Diving Supervisor(s) will maintain a record of information required for the divers' logbooks and the Diving Operations Log:

- i. *date;*
- ii. *dive location;*
- iii. *type of dive (shore, boat, etc);*
- iv. *dive Supervisor;*
- v. *names of divers and any other personnel involved;*
- vi. *all decompression schedules used;*
- vii. *tick list of all diving equipment checked to be in working order during the "buddy check";*
- viii. *contents of air cylinders before and after the dive;*
- ix. *time at start and end of dive;*
- x. *maximum depth;*
- xi. *decompression requirements (and desaturation times if available)*
- xii. *weather conditions;*
- xiii. *provisions made for special emergency support.*
- xiv. *details of any emergencies/equipment defects;*

The Diving Supervisor(s) must sign the Diving Operations Log at the end of each Diving Operation.

9.2 Working diver's personal log

Following diving, each Diver will complete and sign a dive record in their *personal dive log* and ensure that the record is countersigned by the Diving Supervisor. The record will include the information collected by the Diving Supervisor and, in addition, details of:

- i. *decompression tables or computer used;*
- ii. *any illness or adverse effects during diving;*
- iii. *any defects in equipment;*
- iv. *any adverse environmental conditions;*
- v. *details of task completed and any tools used.*

10 Emergency Procedures

10.1 Therapeutic recompression facilities

The ACoP states that *the Diving Contractor* (Diving Project Manager in the UWB) *has a responsibility to ensure the provision of facilities so that a diver can be recompressed in an*

emergency, should this be necessary. In all circumstances treatment should be given as soon as possible. The provision of a recompression chamber should be in accordance with the decompression procedures selected as part of the Diving Project Plan.

There are three categories with respect to recompression requirements:

1. For dives with no planned in-water decompression and that are **less than 10 metres** the Diving Project Manager should identify the nearest suitable operational two-person, two compartment chamber. Under no circumstances should this be more than **6 hours** travelling distance from the dive site.

2. For dives over 10 and up to 50 metres with either:

- no planned in-water decompression; or
 - with planned in-water decompression of up to 20 minutes,
- a suitable two-person, two-compartment **chamber should be within 2 hours travelling distance** of the dive site

In practice most of the UWB diving will fall into this category although it is recommended that all dives within UWB avoid requiring decompression stops. However, there may well be instances where the divers intend to stay down up to the limit of their no-stop time, in which case they should be aware of any likely decompression requirements in case they overrun for any reason. Planned decompression may be necessary in some cases in order to complete specific tasks. In such cases the dives must be carefully planned (and the details included in the Diving Project Plan) and any decompression requirement kept to a minimum.

3. For dives with planned in-water decompression stops greater than 20 minutes a suitable two-person, two-compartment chamber should be provided for immediate use at the site of the Diving Project. Such diving requiring lengthy decompression is not recommended for UWB divers.

When diving in remote areas, this two hour transfer time is dependent upon the availability of Air Sea Rescue helicopters and the availability of recompression chambers. Diving Supervisors must ensure that they have an adequate means of contacting the coastguard **before diving commences**.

If the two hour transfer time is not possible a suitable two-person, two-compartment chamber should be provided for immediate use at the site of the Diving Project.

10.2 First aid training and oxygen administration (including oxygen therapy for hyperbaric injuries)

The ACoP states that *the Diving Contractor* (Diving Project Manager in the UWB) *is responsible for ensuring that enough people in the Diving Project are trained to the required standard of first aid. The risk assessment will identify the first aid equipment required on site and the number of personnel needed to use it.*

The administration of oxygen as a means of first aid to a diver suffering from decompression sickness or burst lung has been proven to have a significant benefit to a casualty's condition. The effectiveness of resuscitation being applied to a non-breathing casualty can also be improved if oxygen can be introduced into the procedure.

Oxygen administration equipment must be readily available at the site of all Diving Operations.

If a Diver misses a scheduled decompression stop, or has been subject to any abnormal ascent, he/she should be administered oxygen immediately and closely monitored for any signs of decompression illness/lung damage.

The ACoP states that *at least one member of the dive team should be qualified in resuscitation and oxygen administration* – and that person has to remain on the surface as part of the surface support team (e.g. Supervisor). However, there are circumstances when it would be sensible to have more than one suitably qualified person in the team, particularly if the whole team is required to dive.

To avoid the situation where part of the team is unable to dive or not familiar with emergency procedures **all divers in UWB should be trained in first aid, resuscitation and the use of oxygen for first aid. They should also be familiar with the oxygen administration equipment available at the site of a Diving Operation.**

Volunteer and Student Divers should have a basic understanding of first aid; the Diving Supervisor must be satisfied that this understanding is suitable for the planned Diving Operations.

10.3 First aid kits

Diving Contractors must inform all personnel of the provisions made for first aid and the location of first aid and oxygen administration kits. The size and contents of the first aid kit must allow for the number of persons involved in the diving operation, the location of the dive site, the anticipated time for further assistance to arrive, any special hazards identified by the risk assessment and the medical competencies of the on site personnel.

First aid kits must be clearly marked and readily available at the site of all Diving Operations. As a guide, for a small group working in a non-remote location with no particular hazards envisaged the first aid kit should contain, in addition to medical oxygen, at least (as listed in the SDCS Advice Notes):

- A mask and bag manual resuscitator, with oxygen feed;
- 3 airways (1 each size);
- 4 aluminium foil blankets;
- A windproof body bag;
- 3 large sterile unmedicated dressings;
- 3 medium sterile unmedicated dressings;
- 4 triangular bandages;
- 6 safety pins;
- A selection of adhesive dressings;
- A pair of sharp ended and a pair of blunt ended scissors;

The industry standard first aid courses run by, for example, the St John's and St Andrew's Ambulance services, are sufficient to cover the legal requirement for basic first aid training (these should be supplemented by an oxygen administration course). After an initial four day course and exam, a two day refresher course is required within three years to keep the qualification current. Further training and refresher courses which include first aid for divers are strongly recommended and should be part of each agency diver's annual refresher course (Section 3.15).

11 Diving equipment

11.1 Mandatory safety equipment

When diving below 10 m each diver shall have a watch, a depth gauge calibrated in metres and a slate with decompression tables; an electronic diving computer can substitute decompression tables.

For all diving each diver must have a **mechanically independent alternative/reserve air supply**. That is the air supply must come from an independent source other than the diver's main cylinder. Approved alternative air supplies are a pony cylinder connected to a separate demand valve (or to an 'Air II/'Autoair') or combined small capacity cylinder/demand valve units such as 'Spare Air'. For dives deeper than 18 m a pony cylinder is recommended rather than the smaller Spare Air to allow adequate time for a safe ascent rate following a main air supply failure.

Octopus rigs from the same first stage as the diver's main air supply are **not** considered as **independent** alternative air supplies.

All divers must have a device to achieve positive buoyancy independent of their breathing air supply or diving suit. That is, all divers must wear an Adjustable Buoyancy Life Jacket (ABLJ) or Stabiliser Jacket (Stab) with an emergency air cylinder or carbon dioxide cartridge for emergency inflation.

11.2 Equipment maintenance

DWR 97 Regulation 6(3)(c) states that *the Diving Contractor shall ensure that the plant made available under sub-paragraph (b) is maintained in a safe working condition.*

The ACoP states *that where they can affect the personal safety of the dive team, all items of plant and equipment owned by, or hired by the Diving Contractor should have a **maintenance record showing that it has been checked by a competent person within a period not exceeding six months before use** (more frequently if required by manufacturer' recommendations or international, European or national standards – this does not include the periodic inspection and tests carried out on diving cylinders). This record should identify the item of equipment, show the date of the check, the signature of the competent person, any limitation as to use, and any repairs or modifications carried out.*

One person in each School, Department, Centre of UWB holding diving equipment should be made responsible for that equipment unless items are specifically assigned to individual members of staff, in which case they are individually responsible. In which case, an annual recall and check of all the School's, Department's or Centre's equipment should be carried out by those responsible (Equipment Officers) for equipment in that part of UWB.

In order to ensure that the equipment is maintained, the Diving Contractor/Diving Project Manager should have access to a written scheme of equipment maintenance and inspection (a task carried out by the Equipment Officer).

All plant and equipment should also be checked immediately before use and this check entered in the Diving Operation record. In UWB, this task would normally be carried out by the divers themselves prior to diving. If any piece of equipment appears faulty or ill fitting the defects must be reported to the Diving Supervisor on duty and the problem rectified (or the equipment changed) before the commencement of the dive.

11.3 Cylinders and compressors

Breathing gas cylinders should be manufactured to BS5045 (Part i: steel; Part iii: Aluminium; Part iv: less than 0.5 l water capacity), be marked with their working pressures, and preferably be legibly marked "breathing air" and should have a black and white quartering pattern around the top of the cylinder. Cylinders must be tested according to BS5430 and DWR 1981 by an

approved test house. Cylinders require a hydraulic test and visual inspection every four years and a visual only inspection every two years.

Diving compressors must be serviced according to manufacturers' specifications and clearly marked with their maximum working pressure.

11.4 Purity of breathing gas

Air compressors must be well maintained - to the manufacturer's standards - with a log book showing filter and oil changes. Care must be taken to ensure that the air at the intake is as clean and pure as possible. Air tests, using a proprietary gas analysis kit, must be taken regularly. The recommended standards of air purity (according to BS 4001 1998) in the UK are as follows :-

Nitrogen.	As atmospheric
Oxygen.	As atmospheric
Carbon dioxide	500 parts per million
Carbon monoxide	10 parts per million
Oil	1 milligram per cubic metre
Water	0.5 g per cubic metre
Solids and dust	Free from dirt, dust, and metallic particles
Odour and taste	Free from odour and toxic or irritating ingredients

12 Boat operations and equipment

Specific risk assessments for boat handling and launching etc., including lists of safety equipment, should be produced in School, Departmental and Centre Health and Safety Policies (eg the School of Ocean Sciences Health and Safety Policy Appendix H Field work and Field Courses section C Small Boat Work). Boat handling with respect to diving operations is not always covered in standard boat handling courses. Special considerations should therefore be made to ensure that any dive boat cox'n has had sufficient practice in delivering and recovering divers to and from the dive site.

The code of practice for the safety of small workboats and pilot boats has been developed by the Maritime and Coastguard Agency. Workboats in UWB have to comply with this code.

Appendix 1: Examples of hypothetical Diving Project Plans: 1 (From the Countryside Council for Wales)

To: Dr Malcolm Smith (CCW named Diving Contractor) and Lucy Kay Diving Project Manager for CCW NW Area.

CC: All members of survey team listed below

Title of Project:	
Monitoring trails using MNCR style survey and video off Sarnau Reefs (N Cardigan Bay)	
Date:	15-21 August 1998
Location of diving operations:	Sarn Badrig Reef. Departing from Pwllheli Marina on a daily basis – distance from Pwllheli max . 12 n miles.
Diving Project Manager & Diving Contractor:	Lucy Kay (North West Area) on behalf of Dr Malcolm Smith, Countryside Council for Wales,
Names of Supervisors required (with Oxygen administration and 1 st aid qualifications):	Rohan Holt (UWB/CCW), Bill Sanderson (CCW), Lucy Kay (CCW), Kate Northen (UWB), Francis Bunker (independent surveyor), Frances Dipper (independent surveyor), Christine Howson (independent surveyor), Christopher Spurrier (independent surveyor).
Names of Divers and qualifications:	Rohan Holt, Bill Sanderson, Lucy Kay, Francis Bunker, Mandy Richards, Kate Northen, Frances Dipper, Christine Howson, Christopher Spurrier, Christine Maggs – All fully qualified to dive under Scientific and Archaeological ACOP. (CM not qualified – no oxygen administration certificate - to act as supervisor). All have in-date medicals.
Names of other personnel required and their duties:	
Others:	Dora Nichols. Contracted by CCW as general survey assistant (also qualified to act as volunteer diver).
Any other groups / persons to contact before diving ops take place.	NW&NW Sea Fisheries Committee – Greta Hughes contacted to inform of diving operations in area.
Equipment required:	Standard SCUBA; SMB and line for communications purposes; tape measure for gauging distance along transect line; underwater video camera; writing boards; small lifting bags for shot and tape (i.e. no heavy manual handling or tools required underwater).
Any special competencies required from any personnel:	All qualified as scientific divers or equivalent
Site specific details:	
Sea conditions anticipated:	Site exposed to weather from north; west; south-west (less exposed to east). Sea state reaches moderate in more than force 4. Diving operations will be called off if conditions exceed moderate sea state from SW round to N.
Tidal conditions:	Slack water estimated at Milford Haven low water up to two hours before high approx, otherwise tide runs at up to 0.5 knots
Anticipated minimum underwater visibility:	5 m
Pollution:	None significant.

Depth:	20 m maximum (most dives at less than 10 m)
Temperature:	Approximately 14 °C
Access:	RIBs Tritonia and Aplysia (from Pwllheli marina)
Breathing gas:	Air (Using Tynrhos diving compressor)
In-water and surface communications requirements:	SMB and life line sufficient. Full voice underwater communications systems not deemed necessary for methods being used on this survey. For any diving involving laying transect lines from the bottom of a shot line, delayed SMBs will be used as a surface communication system to avoid entanglement with the other ropes in use. In all situations where the divers are not carrying a normal SMB all divers (i.e. both divers in a pair) must carry a delayed SMB
Emergency Information	
Emergency procedures such as recompression chamber access:	Call in to Holyhead Coastguard prior to diving (also mobile phone available).
HM Coastguard No.	01407 762 051
Chamber No.	Hyperbaric Treatment and Training Services, BUPA Murrayfield Hospital, Holmwood Drive, Thingwell, Wirral. 24 hour telephone queries 0151 648 8000 – checked operational 27 July 1998. No requirement for ‘booking’.
Duty Diving Medical Specialist HMS Nelson, Portsmouth	01705 818 888
Medical expertise:	All team qualified as first aiders
Medical equipment:	Oxygen and 1st aid kits on board Tritonia and Aplysia
Casualty evacuation plan:	Contact Holyhead coastguard by VHF CH 16. Possible ambulance pick up points at Pwllheli and Barmouth depending on proximity to nearest coastline and wind direction.

Other notes:

Diving tasks

In brief the divers will be surveying along transect lines (50 m long tapes on reels) from pre-determined locations (marked with a shot) across the Sarn Badrig reef. The main aim is to record sufficient detail to characterise the biotope(s) present on each transect line. The divers will descend the shot line then attach the end of the tape measure to the loop of rope attached to the shot weight. MNCR-style records of species and abundance are to be made along the transect line (1.5m each side of the line – a guide pole will be provided) as the tape is reeled out, making separate records within each biotope. At the end of the 50 m tape (or sooner if bottom time is limiting) a small delayed SMB will be used to send the end of the tape and reel towards the surface and the divers will ascend up one of the pair’s own delayed SMB (both divers must carry delayed SMBs in this situation, although only one need be deployed if both divers ascend together). In the event of slight tidal streams being encountered on the seabed the divers should take care not to haul on the tape measure.

Other survey using MNCR recording techniques will be planned on other sites around Sarn Badrig and in Tremadog Bay if time allows. Video records to compliment this part of the survey will be carried out during some of these dives.

Project plan prepared by:

Lucy Kay

12 Aug. 98

Appendix 1 ctd. Example of hypothetical Diving Project Plans: 2

To: Dr Malcolm Smith (CCW named Diving Contractor) from Phil Newman Diving Project Manager at Skomer MNR.

CC: All members of survey team listed below

Title of Project:	
Routine data collection/maintenance of sediment traps around Skomer Marine Nature Reserve	
Date:	From spring 1998 once every month
Location of diving operations:	Within 1.5 km of coastline of Skomer Island, Pembrokeshire at 5 locations.
Diving Project Manager & Diving Contractor:	Phil Newman (Skomer MNR) on behalf of Malcolm Smith, CCW's Diving Contractor
Names of Supervisors required (with Oxygen administration and 1 st aid qualifications):	Phil Newman, Kate Lock, Blaise Bullimore.
Names of Divers and qualifications:	Phil Newman, Kate Lock, Blaise Bullimore. All qualified as scientific divers or equivalent. Divers will dive solo unless accompanying a 'new' volunteer.
Names of other personnel required and their duties:	Mike Camplin – boathandler
Others:	Volunteer divers may stand in place of any of the above personnel. Specific risk assessment for each day's diving when volunteers are expected to take part will identify each volunteers' qualifications and suitability for allotted tasks.
Any other groups / persons to contact before diving ops take place.	Contact the Skomer ferry if any work being done in the ferry's path when it is likely to be running.
Equipment required:	Standard SCUBA plus SMBs and reels, collecting bags and small lifting bag
Any special competencies required from any personnel:	Prior experience of changing sediment traps advisable – any volunteers taking part will be shown what is required.
Site specific details:	
Sea conditions anticipated:	Most dives will take place in locally sheltered areas. Dives will not take place if the sea state exceeds 'moderate'.
Tidal conditions:	Dives will take place at slack water as calculated on the day for sites situated around the island. Other sites can be dived at any state of the tide. See specific day's risk assessment for slack water times.
Anticipated minimum underwater visibility:	1-5 m. Dives will not take place in less than 1 m.
Pollution:	None anticipated
Depth:	Deepest site 17 m, all others between 12 and 14 m.
Temperature:	12-14 °C
Access:	By boat to all locations
Breathing gas:	Air from W Wales Divers

In-water and surface communications requirements:	Diver descends fixed buoyed rope at site z which will be attached to the boat (solo diver carries a delayed SMB and reel. Diver may clip reel line to bottom of shot if moving away from shot). Communication line attached directly to anchored boat at sites x and y (diver takes reel). Line and SMB sufficient at all other sites.
Emergency Information	
Emergency procedures such as recompression chamber access:	Local chamber at x known to be operational. Coastguard informed prior to all diving operations.
HM Coastguard No.	Coastguard contact No. 0000 000 000 & VHF ch16
Chamber No.	Chamber contact No. 0000 000 000
Duty Diving Medical Specialist HMS Nelson, Portsmouth	01705 818 888
Medical expertise:	All personnel have 1 st aid and oxygen administration training
Medical equipment:	Oxygen and 1 st aid kits on board boat
Casualty evacuation plan:	CH 16 VHF contact with coastguard. Boat will return to Martin's Heaven. Anticipate either helicopter evacuation from landing site at x or ambulance from Martin's Haven road.

Other notes:

Diving tasks

In brief the divers will descend down the shot line or rock face carrying a bag of empty traps to the framework holding the full sediment traps at each site. Lids to be placed on top of each full trap which are then unclipped from the frame and carefully placed in sealable plastic bags taking care not to spill the contents. Fresh traps are then to be positioned in each empty space in the frame. A bag containing all the full traps can then be guided to the surface using a small lifting bag as the diver returns up the shot line.

Diving Project Plan prepared by:
Phil Newman 1 April 1998

Appendix 2: Example of daily risk assessment and log sheet

DIVING OPERATIONS DAILY RISK ASSESSMENT & LOG

Action required: Yes/no*

Geographical location _____	Date _____
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Diving Project _____ UWB/Other* Name: _____
 Manager / Contractor: _____

Shore/Vessel (name)* _____ Equipment used: SCUBA /Other*: _____
 Breathing mixture: _____
 Air/Other*: _____ Stage decompression: Yes/no*

Decompression schedule used: _____
 Tables/Computers*(State types) _____

Description of work / title of Diving Project _____

Diving supervisors	Period of supervision	Signature(s)

Tidal information:
 (time of slack water/HW/LW etc.)

Special risks or changes to the Diving Project Plan which should be taken into account before diving ops take place (volunteer divers, personnel, qualifications, shipping movements etc.)

Emergency Information

Coastguard Area
 Coastguard telephone No.
 Nearest chamber checked operational?
 Diver first aid advice available from Duty Diving Medical Specialist, HMS Nelson,
 Portsmouth, Tel. 01705 818888 (Britain), National Hyperbaric Unit, Galway Tel 091 24222
 (Ireland)
 Coastguard on Channel 16 or telephone 999

Any emergency /incident: Yes/no*	Decompression sickness/illness/adverse effects: Yes/no*	Adverse environmental factors: Yes/no*	Equipment defects: Yes / no*
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If 'yes' to any of the above, give details: _____

*Delete where appropriate

UNIVERSITY OF WALES BANGOR

Diving Project Plan

To: _____ UWB named Diving Contractor
From: _____ Diving Project Manager
CC: All members of survey team listed below

Title of Project:	
Date:	
Location of diving operations:	
Diving Project Manager & Diving Contractor:	
Names of Supervisors required (with Oxygen administration and 1 st aid qualifications):	
Names of Divers and qualifications:	
Names of other personnel required and their duties:	
Others:	
Any other groups / persons to contact before diving ops take place.	
Equipment required:	
Any special competencies required from any personnel:	
Site specific details:	
Sea conditions anticipated:	
Tidal conditions:	
Anticipated minimum underwater visibility:	
Pollution:	
Depth:	
Temperature:	
Access:	
Breathing gas:	
In-water and surface communications requirements:	
Emergency Information	
Emergency procedures such as recompression chamber access:	

HM Coastguard No.	Coastguard contact No.	& VHF ch16
Chamber No.	Chamber contact No.	
Duty Diving Medical Specialist HMS Nelson, Portsmouth	01705 818 888	
Medical expertise:		
Medical equipment:	Oxygen and 1 st aid kits	
Casualty evacuation plan:		

Other notes:

Diving tasks

Diving Project Plan prepared by:

Date:

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Diving Project Plan

To: Dr David Roberts Academic Registrar UWB named Diving Contractor
From: Dr John R Turner Diving Project Manager
CC: All members of survey team listed below

Title of Project: Diving Studies at Lough Hyne Marine Nature Reserve, Co. Cork, Ireland	
Date:	21 st July – 12 th August
Location of diving operations:	Lough Hyne, Co. Cork, Ireland 51 ^o 29'N, 9 ^o 18'W
Diving Project Manager & Diving Contractor:	Dr John R Turner (School of Ocean Sciences, UWB) on behalf of Dr David Roberts (Diving Contractor, UWB)
Names of Supervisors required (with Oxygen administration and 1 st aid qualifications):	Dr John Turner, Dr Kirsten Ramsey, James Bell, David Bointon, Alan Birch
Names of Divers and qualifications:	Alan Birch, James Bell, David Bointon, Kirsten Ramsey, Dr John Turner (Qualified as Advanced Diver or equivalent) Matthew Frost, Andrew Bendall Alexandra Hirons, Dori Murch, Charlie Lindenbaum, Nat Spring, Sam Vize (Student/Volunteers qualified to Dive Leader) Adam Reeves (Snorkelling, & dive restricted to 6m)
Names of other personnel required and their duties:	
Others:	Students may stand in place of any of the above personnel. Specific risk assessment for each day's diving when students are expected to take part will identify each student's qualifications and suitability for allotted tasks.
Any other groups / persons to contact before diving ops take place.	Mr Declan O'Donnell, Wildlife Ranger and Warden, Lough Hyne Marine Reserve
Equipment required:	Standard SCUBA
Any special competencies required from any personnel:	No
Site specific details:	
Sea conditions anticipated:	Very sheltered and flat calm (sea loch)
Tidal conditions:	Current in rapids, Whirlpool and South Basin Slope for 4 hours during tidal inflow
Anticipated minimum underwater visibility:	Dives will not take place in less than 1 m visibility.
Pollution:	None anticipated

Depth:	Cliff features to 20m, but mud slopes below in region of Western Trough approach 40m.
Temperature:	12-16 degrees Centigrade
Access:	Shore or boat
Breathing gas:	Air from UWB or UCC compressor
In-water and surface communications requirements:	SMB and life line when away from cliff faces. Delayed SMB at sites where divers may leave feature. No SMB if dive restricted to feature. Full voice communications not deemed necessary for methods employed.
Emergency Information	
Emergency procedures such as recompression chamber access:	Contact Coastguard first. Alert National Hyperbaric Advice and Attention Unit: 091(5) 24222 x 4331, Dept Anaesthetics, Regional Hospital, Galway.
HM Coastguard No.	Coastguard contact No. & VHF ch16
Chamber No.	For chamber, contact No. 091(5) 24222 x 4331. Chambers at Galway (6 hours) and Cork (1-1.5 hours)
Duty Diving Medical Specialist HMS Nelson, Portsmouth	01705 818 888
Medical expertise:	All members of team are qualified first aiders
Medical equipment:	Oxygen and 1 st aid kits
Casualty evacuation plan:	Contact coastguard. Ambulance pick up points at North quay, West Quay, or helicopter pick up from North quay if cleared or middle of lough by boat.

Other notes:

See accompanying document detailing *Lough Hyne Diving Operations Risk Assessment and Local Diving Rules*

Diving Project Plan prepared by: Dr J R Turner

Date: 1st July

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Diving Project Plan

To: Dr David Roberts / SOS Safety Officer UWB named Diving Contractor
From: Dr John R Turner Diving Project Manager
CC: All members of survey team listed below

Title of Project:	
Environmental Monitoring Baseline Survey at Montagne Jacquot, Mauritius	
Date:	21 st November – 9 th December
Location of diving operations:	West coast of Mauritius
Diving Project Manager & Diving Contractor:	Dr John Turner on behalf of Dr David Roberts (Academic Registrar)
Names of Supervisors required (with Oxygen administration and 1 st aid qualifications):	Dr John Turner, Ms Rebecca Klaus, Ms Emily Hardman (UWB), Mr Olivier Tyack, Mr Sharveen Persands, Mr Vassen Kauppymuthoo , Xavier Pigeot, Mr Daniel Pelicier (Mauritius)
Names of Divers and qualifications:	Dr John Turner (PADI Divemaster), Ms Rebecca Klaus (BSAC Advanced Diver), Ms Emily Hardman (BSAC Advanced Diver, Mr Olivier Tyack (PADI Open Water Scuba Instructor, CMAS ** Instructor) Mr Sharveen Persands (PADI Open Water Scuba Instructor) , Mr Vassen Vassen Kauppymuthoo (CMAS *** diver), Xavier Pigeot (CMAS ** Instructor), Mr Daniel Pelicier (? very experiencd)
Names of other personnel required and their duties:	Mr Richard Boak: Operations & Project Manager Mr Seetiah: Support & Ground Team Coordinator Dr Deolall Daby: Water Quality Scientist
Others:	Vehicle driver/boat skipper / boatman
Any other groups / persons to contact before diving ops take place.	Waste Water Management Authority, Government of Mauritius (re: site access)
Equipment required:	SCUBA / Air / local hard boat
Any special competencies required from any personnel:	Fish recording – Daniel Pelicier Diving management: Dr John Turner & Mr Vassen Kauppymuthoo Underwater video & digital photography: Dr John Turner LIT & Biodiversity Emily Hardman & Rebecca Klaus, Olivier Tyack & Sharveen Persands Rescue Diver: Xavier Pigeot
Site specific details:	
Sea conditions anticipated:	Outside reef: calm in November/December. SE winds weak (faster than 5.5m per sec for only 8% time over year). Expect

	shift from SE in November to E in December. Max wind speed 10m per sec. Sea breeze blows 1430 -1600hrs However, because of absence of fringing reef at some sites, can expect oceanic swell. Rain fall low <50mm per month September to November. Expect sea temperature to be 24-25 degrees Centigrade. Calmer inside lagoons, but water clarity may be reduced.
Tidal conditions:	0 to 0.3m per sec parallel to coast, mostly north eastwards
Anticipated minimum underwater visibility:	Good >10m and up to 30m
Pollution:	In excess of acceptable limits in Pointe aux Sable lagoon due to industrial and domestic sewage discharges in lagoon, and potentially poor on Pointe aux Sable reef front. May also be poor at Petite Riviere if wind onshore due to sewage outfall to south
Depth:	To 30m
Temperature:	24-25 deg C expected
Access:	By boat from Petite Riviere, or pther site, West coast
Breathing gas:	Air
In-water and surface communications requirements:	Line and surface marker buoy sufficient at all sites due to clear water and air visibility. Whistles at surface. Diver A flag. Mobile phone / radio to shore.
Emergency Information	
Emergency procedures such as recompression chamber access:	Police Information Room to contact Central Communication Centre, National Coastguard etc: 112 or 212 1212 or 208 1212 Hyperbaric facilities (Dr Gajaloo 697 5471 / 674 7451) Special Mobile Force, Vacoas. Clinic Dorne Ambulance 686 1477 Hospitals Port Louis 212 3201 Pamplemousse 243 4661
HM Coastguard No.	Coastguard contact No. or 212 1212 or 208 1212 & VHF ch16
Chamber No.	Chamber contact No. Dr Gajaloo 697 5471 / 674 7451
Duty Diving Medical Specialist HMS Nelson, Portsmouth, UK	+44 1705 818 888
Medical expertise:	Diving team First Aid trained + Oxygen resuscitation trained
Medical equipment:	Oxygen and 1 st aid kits
Casualty evacuation plan:	1. Maintain breathing/circulation. Remove from water. 2. If suspected decompression/embolism, give 100% oxygen. Lie casualty down & raise legs. 3. Stem any bleeding. Treat shock. Seek help: 4. Contact Police Emergency Centre as soon as possible. Advise of diving/boating emergency. State require assistance / casualty evacuation. Give position. Require ambulance or helicopter at nearest accessible shore site (Pointe aux Sable, Petite Riviere/Albion, Montagne Jacqout, or Le Morne). Give vessel description & number in party. 5. Make for shore as fast and as safely possible to rendezvous with ambulance/helicopter. Maintain First Aid treatment.

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Other notes: No air sea rescue helicopters in Mauritius. Police helicopter used.

Particular care:

- (1) To avoid stonefish in rocky/cobble bottom areas;**
- (2) To avoid swallowing jellyfish if there are onshore swarms;**
- (3) Beware that Montagne Jacquot site is not one frequently dived, and although sharks are rare, hammering activity in deeper water may just cause an attraction.**

Diving tasks

Snorkelling within the lagoon may take place from the shore. Snorkelling and diving outside of reefs will always involve boat cover. The snorkelling and diving works involves:

Divers work in pairs, laying out 3 x 50m transects along depth contours using tape measures stretched between metal stakes which are hammered into the substrate using lump hammers. Line Intercept transects, video transects, digital photography and biodiversity assessments will then be made, usually on separate dives.

Diving is planned at 3 depth sites at Montagne Jacquot (7-10m, 18m, 27m) one site at Point aux Sable (7-10m), one site at Petite Riviere (7-10m) and one site at Ile aux Benitier (7-10m).

Snorkelling is planned at 1-3m within the reef at the above sites (except Montagne Jacquot, and probably at Pointe aux Sable if water quality obviously poor)

Full details of planned work are in Montagne Jacquot Environmental Monitoring Report (WMC, 2002).

Diving Project Plan prepared by: Dr J R Turner

Date: 17/11/03

