APPROVED CODE OF PRACTICE FOR TUNA FARM DIVING

OCCUPATIONAL HEALTH, SAFETY AND WELFARE ACT, 1986

Notice of Approval of a Code of Practice

Notice is hereby given that pursuant to subsection 63(1) of the Occupational Health, Safety and Welfare Act, 1986, the following Code of Practice for Tuna Farm Diving, is an approved code of practice.

This code of practice shall have effect from 1 January 1997 excluding clause 2.5 which shall have effect from 1 January 1999.

SOUTH AUSTRALIAN GOVERNMENT

CODE OF PRACTICE

FOR

TUNA FARM DIVING

NB: Based on Australian Standard 2299-1992: Occupational Diving
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1996

FOREWORD

This is an approved code of practice. The term approved code of practice has a particular meaning under the South Australian Occupational Health, Safety and Welfare Act, 1986.

An approved code of practice provides minimum standards of health and safety and is designed to be used in addition to the Act and regulations. In proceedings for an offence against the Act where it is proved that a person failed to comply with a provision of a relevant approved code of practice, the person shall be taken to have failed to exercise the required standard of care, in the absence of proof to the contrary (Section 63a of the Act).

Thus, a code of practice provides practical guidance on how a particular standard of health and safety can be achieved. It describes the preferred methods or courses of action for achieving this standard of health and safety.

However, an approved code of practice allows the flexibility to show that an equivalent or better standard of health and safety is achieved by alternative action. An approved code of practice is therefore different from a regulation where the responsible person must meet the specific requirement of the regulation.

In summary, an approved code of practice:

X provides practical guidance;

X should be followed unless there is another solution which achieves the same or a better standard of health and safety; and

X can be used to support prosecution.

Codes of practice are approved by the Minister of Occupational Health and Safety, following a recommendation from the Minister for Industrial Affair=s Occupational Health, Safety and Welfare Advisory Committee.

This approved Code of practice also includes some references to obligations imposed by an act of Parliament or regulation. These obligations are preceded by the word Ashall≅ Failure to observe these obligations is an offence against the Act or regulation. Preferred methods or courses of action are preceded by the word Ashould≅.

This Approved Code of Practice is based almost entirely on Australian Standard 2299-1992 Occupational Diving (AS2299). The Standard was prepared by the Standards Australia Committee on Work in Compressed Air. This committee comprised of 22 people representing employers, employees and government with expertise in diving and/or diving related issues. Special thanks is given to Standards Australia for their kind permission to reproduce AS2299 with minor modifications as an Approved Code of Practice. The illustrations for the hand signals shown in Appendix F are reproduced with the permission of PADI Australia Pty. Ltd.

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SECTION 1 INTRODUCTION

1.1 TITLE This Code may be cited as the Approved Code of Practice for Tuna Farm Diving (the Code).

1.2 AUTHORITY This Code is approved pursuant to section 63 (1) of the South Australian Occupational Health, Safety and Welfare Act, 1986 (the Act) and shall have effect from 1 January 1997.

1.3 PURPOSE The purpose of this Code is to provide practical guidance for diving work conducted in association with tuna farming.

This Code is also to be used in conjunction with the Act and its associated regulations which establish the responsibilities of parties including employers, the self employed, contractors, employees, manufacturers and suppliers.

1.4 SCOPE This Code applies to underwater operations using compressed air as the breathing medium conducted in, or in association with, the tuna farming industry of South Australia. Diving operations performed in accordance with this Code should be limited to a maximum depth of 30 metres. For diving operations using other than compressed air as the breathing medium or for dives beyond 30 metres, special safety precautions, in addition to those specified in this Code, must be taken.

Note: The appropriate provisions of this Code also apply to snorkel diving.

This Code applies to underwater diving operations using either surface-supplied breathing apparatus (SSBA) or self-contained underwater breathing apparatus (SCUBA).

Due to the risk of entrapment associated with nets, SCUBA is not considered appropriate for the vast majority of diving work performed in the tuna farming industry. Specific requirements for SSBA diving operations are given in Section 5 and those for SCUBA diving operations are given in Section 6.

This Code includes minimum requirements for personnel, procedures to be followed in diving, the equipment to be utilized, together with appendices dealing with the following subjects:

(i) Medical standards and examination reports.
(ii) Example of approved decompression tables.
(iii) Therapeutic recompression treatment.
(iv) Minimum qualifications for divers.
(v) Personal records of dives and medical examination.
(vi) Example of lifeline signals.
(vii) Example of employer's record of dives.
(viii) Typical compression chamber medical kit.
(ix) Contents of a diving operations manual.
(x) Locations of medical practitioners with training in diving medicine.

1.5 REFERENCED DOCUMENTS The following documents are referred to in this Code:

AS
1210 SAA Unfired Pressure Vessels Code
1269 Acoustics X Hearing conservation
1337 Eye protectors for industrial applications
1885 Measurement of occupational health and safety performance
1885.1 Part 1: National Standard for workplace injury and disease recording
1944 Medical gas cylinder identification
2030 SAA Gas Cylinders Code
2030.1 Part 1: Cylinders for compressed gases other than acetylene
2705 Portable cylinders for self-contained underwater breathing apparatus (SCUBA) X Safety guide
2815 Training and certification of occupational divers
2815.1 Part 1: SCUBA diving to 30 m
2815.2 Part 2: Air diving to 30 m
2815.3 Part 3: Air diving to 50 m
2815.4 Part 4: Bell diving
3000 SAA Wiring Rules

4005 Training and certification of recreational divers
4005.1 Part 1: Minimum entry-level SCUBA diving

ISO
2230 Vulcanized rubber X Guide to storage

ANSI/ASME
Boiler and Pressure Vessel Code

Approved Code of Practice for Occupational Health and First Aid in the Workplace

1.6 DEFINITIONS For the purpose of this Code, the definitions below apply.

1.6.1 Bottom time (BT) X the total elapsed time from when the diver leaves the surface to the time (next whole minute) that he begins his ascent, measured in minutes.

1.6.2 Breathing tubes X tubes attached to a regulator that are designed to X

(a) supply air to the diver;

(b) carry away expired air; and

(c) operate at near ambient pressure.

1.6.3 Compression (recompression) chamber X a surface chamber in which persons may be subjected to pressures equivalent to or greater than those experienced when under water, or under conditions which simulate those experienced on an actual dive.

NOTE: For the purpose of this Code, `compression chamber' is taken to include `recompression chamber'.

1.6.4 Decompression schedule X a specific decompression procedure for a given combination of depth and bottom time as listed in a decompression table; it is normally described as maximum depth (MSW)/bottom time (minutes).

1.6.5 Decompression sickness (bends) X the development, during or after diving, of any abnormality which is a direct result of a reduction in the tension of inert and other gases dissolved in the body, with the production of gas bubbles. Any organ may be involved and its presentation can vary from the acute to the chronic.

1.6.6 Decompression stop X the specific length of time which a diver must spend at a specified depth to allow for the elimination of sufficient inert gas from his body to allow him to safely ascend to the next decompression stop or the surface.

1.6.7 Dive control position X a single, designated location which is adjacent to where a diver enters the water and from which the diving supervisor can supervise and monitor all systems and functions which relate to the life support and safety of a diver in the water.

1.6.8 Diver X a person trained in accordance with the appropriate part of AS 2815.

1.6.9 Dive plan X the procedure by which this Code and any additional precautions are implemented for a particular diving operation.

1.6.10 Dive site X the underwater location where work is performed and any surface zone used to tend or supervise the diver.

1.6.11 Diving work X work in which diving is conducted using underwater breathing apparatus, including work by the dive team in direct support of the diver.

1.6.12 Employee - an employee is defined according to the Act.

1.6.13 Employer - an employer is defined according to the Act.

1.6.14 Free flow primary air supply X a surface-supplied breathing method in which air enters the helmet in a continuous flow, and is not controlled by a demand regulator.

1.6.15 Limiting line X a line shown in air decompression tables, which indicates time limits (bottom times) beyond which decompression schedules are less safe. Diving for periods indicated below the limiting line carries a greater risk of decompression sickness, and this risk increases with time.

1.6.16 NATO flange X a standardized transfer-under-pressure flange.

1.6.17 Occupational diving X diving performed in the course of employment, irrespective of whether or not diving is the principal function of employment or merely an adjunct to it.

Occupational diving comprises all diving carried out as part of a business, a service, for research, or for profit.

1.6.18 Quick release X able to be immediately released from the secured position by the single operation of one hand.

1.6.19 Residual nitrogen X nitrogen that is still dissolved in a diver's tissues after he has surfaced.

1.6.20 Saturation X that condition where the person's body tissues are totally saturated with the particular inert element of the breathing medium.

1.6.21 Self-contained underwater breathing apparatus (SCUBA) X open-circuit diving equipment which supplies the wearer with air from cylinders carried by the wearer.

1.6.22 Supervisor X a diver appointed in writing to supervise diving operations, who is competent to do so and is trained in the recognition of diving emergencies and in the administration of first aid.

1.6.23 Surface interval (SI) X the time which a diver has spent on the surface following a dive; beginning as soon as the diver surfaces and ending as soon as he starts his next descent.

1.6.24 Surface-supplied breathing apparatus (SSBA) X diving equipment which supplies the wearer with compressed air suitable for the depth through a hose from a compressor or storage cylinders at the surface.

1.6.25 Therapeutic recompression tables X tables used for the treatment of decompression sickness and other pressure-related injuries.

1.6.26 Transfer-under-pressure (TUP) system X a system for mating a submersible work chamber or portable compression chamber to another chamber for the purpose of transferring a person under pressure from one chamber to the other.

1.7 OTHER REQUIREMENTS Attention is drawn to the need to also consider the requirements of the Occupational Health, Safety and Welfare Act, 1986 and associated regulations.

SECTION 2 PERSONNEL FOR DIVING OPERATIONS

2.1 SUPERVISOR

2.1.1 Availability At all times while a diver is in the water or under pressure in an on-site chamber, there shall be present, at the dive control position, a supervisor appointed by the person employing the diver (see Clause 1.3.20). The supervisor shall at all times be responsible for the safe conduct of the diving operation.

2.1.2 Qualification of supervisors A supervisor shall be X

(a) a trained, experienced diver, qualified in accordance with Clause 2.2, who has experience in the diving techniques which may be required to be used and in the use of equipment and procedures used in diving operations;

(b) appointed in writing by the diver's employer to supervise diving operations; and

(c) competent to safely carry out the duties required of a supervisor.

A supervisor need not be medically fit to dive provided that a level of fitness relevant to the responsibilities is maintained.

2.1.3 Duties of supervisors A supervisor shall ensure that all diving operations under supervision are carried out in accordance with this Code, and shall be familiar with any statutory regulations and guidelines which may be applicable to the operations.

Note:

Should it be necessary for the diving supervisor to enter the water or leave the dive control position, a second member of the dive team should be delegated to act as diving supervisor and this action noted on the employer=s record of the dive.

Such a person must satisfy the requirements of Clause 2.1.

Where more than one diving supervisor is required, a distinction should be made between their relative responsibilities. This should be done by nominating one of them as Senior Dive Supervisor.

A Senior Diving Supervisor shall have overall responsibility for all facets of the diving operation. A diving supervisor delegated responsibility by the Senior Diving Supervisor shall be responsible for the conduct of the diving operation until such time as the diving operation is complete or the Senior Dive Supervisor has formally resumed control of the operation.

2.2 DIVER No person shall employ, instruct or allow any person to act as a diver, and no dive shall be carried out, unless the diver X

(a) is trained and experienced in diving and in the use of equipment used in diving operations to a level equal to or exceeding that given in the appropriate part of AS 2815, and has a certificate to that effect issued under the Australian Diver Accreditation Scheme (see Appendix D);

(b) is competent to carry out safely the work required in the operation;

(c) has been certified as medically fit to dive in accordance with the requirements of Appendix A by a medical practitioner experienced in underwater medicine; and

(d) is at least 18 years of age.

2.3 DIVER'S ATTENDANT Whenever a diver goes under water or is subjected to pressure, the diver shall be attended by a diver's attendant who shall be 18 years of age or over and have a working knowledge of the following:

(a) The requirements of underwater work.

(b) Signals in use.

(c) Decompression procedures.

(d) Diving plant and equipment in use, including ancillary fittings such as pressure gauges, compressors and filters.

(e) First aid, including expired air resuscitation, external cardiac compression, operation of an oxygen resuscitator and first aid treatment of diving illnesses.

The diver's attendant shall not be engaged, other than as specified in Clauses 5.2 and 6.2, on any task other than that of diver's attendant while the diver is in the water or under pressure.

NOTE:

The role of diver's attendant is a very responsible one and the person fulfilling it has to give full-time attention to this charge, from the time the diver is dressed and ready for the water until the diver is well clear of the water and has stated that he is fit and well.

Dive attendants need special knowledge and skills (listed above) prior to undertaking this role in the dive team. Employers may need to provide special training to dive attendants who are not occupational trained divers to ensure they have the necessary knowledge to carry out their responsibilities (e.g. training in diving first aid). Any training provided should be documented.

2.4 STANDBY DIVER Except as provided for below, whenever a diver is under water, a standby diver shall be present on the surface. The standby diver shall be medically fit, qualified to dive, and dressed to the extent that the diver can enter the water almost immediately to go to the aid of a distressed diver. The standby diver may also perform duties which do not prejudice the safety of the diver in the water.

Notwithstanding the foregoing, where two divers are in the water at the same time one may act as standby for the other provided that no decompression is required following the dive and that both divers have X

(a) visual contact with and direct access to each other at all times;

(b) means of communicating with the surface; and

(c) independent breathing medium supplies of sufficient capacity to support two divers.

The standby diver's dive profile shall be such as to allow all necessary assistance to be given to a distressed diver without the standby diver having to do decompression stops. The exception to the aforementioned is when the depth of water is such that the standby diver will automatically be carrying out a decompression dive. In such circumstances the dive supervisor shall ensure, before any diving operations commence, that sufficient qualified personnel are available to carry out surface decompression procedures.

2.5 DIVE MEDICAL TECHNICIAN A dive medical technician is to be available at all times at the dive operation to administer diving first aid. Dive medical technicians are to hold a current certificate issued by either:

(i) the Royal Adelaide Hospital;

(ii) the Australian Diver Accreditation Scheme;

(iii) the Health and Safety Executive in the United Kingdom; or

(iv) other recognised authorities.

NOTE: For the purpose of this clause Aavailable at all times at the dive operation≡ means that the person cannot undertake diving work unless there is a second dive medical technician on site who is immediately available to administer diving first aid.

2.6 SUPERVISION OF HEALTH

2.6.1 Certification by medical practitioner No person shall dive, or be subjected to pressure unless that person has been examined and certified as fit in accordance with Appendix A by a medical practitioner within 12 months prior to diving.

NOTE: An increase in the frequency of examinations in individual cases is at the discretion of the medical practitioner.

2.6.2 Fitness to dive All persons involved in diving operations should endeavour to ensure that persons involved in such operations are fit to dive. Any noticeable variation in normal feeling of health and fitness should be immediately reported to the supervisor or medical practitioner.

Diving should not be undertaken if the diver is taking medication of any type, prescription or non-prescription drugs, including marijuana, without the advice of an appropriate medical practitioner; or within 8 hours of consuming any intoxicants, unless in an emergency, at which time extra precautions should be taken.

2.7 RECORDS

2.7.1 Diver's logbook Every diver shall keep a logbook which shall be a record of all dives, times and depths of dives. These details should be entered in the logbook at the completion of each working day along with a brief summary of any incidents and accidents. Each entry should be signed by the diver and countersigned by the diving supervisor. The logbook should be available to the employer who should countersign it monthly or as appropriate.

This logbook shall be presented at each medical examination and be available on site. A record of all medical examinations should be contained in the same logbook.

The logbook should be bound, with each page consecutively numbered and entries made in ink.

NOTE: Typical record of dive and record of examination forms are illustrated in Appendix E.

2.7.2 Employer's record Employers shall keep a record of each diving operation, listing the following:

(a) Date.

(b) Supervisor's name.

(c) Diver's name.

(d) Nature of task.

(e) The maximum depth of the dive.

(f) The decompression profile utilized.

(g) Details of incidents and accidents and other relevant details.

NOTE: A typical employer's record is shown in Appendix G.

2.7.3 Maintenance record Where tests are carried out, e.g. for air purity, records of test results, together with identification of the air compressor, shall be maintained for the life of the air compressor.

SECTION 3 GENERAL PROCEDURES FOR DIVING

3.1 ORGANIZATION AND PLANNING

3.1.1 Introduction Diving needs planning and foresight. Bottom time is at a premium. The diver must be placed on the job under the optimum conditions of knowledge, equipment, ability, safety, and freedom from distractions. Topside assistance must be well organized and capable.

Failure to consider any item of available information during the planning stage may jeopardize the lives of divers or result in failure of the diving operation.

Time spent in determining conditions under which the diver will work will result in greater efficiency once the work is commenced.

For commonly performed tasks, basic dive plans and check lists should be incorporated into the diving operation manual.

A written dive plan should be provided.

Special attention is drawn to the increased risk of decompression illness associated with dive profiles where multiple bounce diving occurs. Work processes and dive profiles should be designed so as to minimise the diver=s exposure to the risk of decompression illness and where practicable eliminate the need for multiple bounce diving.

All dives should be planned and conducted in accordance with good diving practice, for example where possible the deepest dive should be performed first.

Control strategies for minimising the risk of decompression illness should be incorporated in the Operations Manual, for example through safe operating procedures for common diving tasks.

When planning extended dive programs the accumulative effects of repeated diving exposures should be taken into account and extra precautions such as programmed breaks in diving should be taken.

3.1.2 Operations manual In order to achieve the above, a diving operations manual shall be provided by the employer. It shall include the items outlined in Appendix J.

3.1.3 Selection of breathing apparatus The decision as to which type of breathing apparatus is appropriate for a given diving operation shall be made after consideration of the type of work to be done by the diver, the equipment required, the conditions under which the diver will work, and the inherent risks and limitations of each type of breathing apparatus.

With respect to the limitations of each type of breathing apparatus the following factors should be considered:

(a) Self-contained underwater breathing apparatus (SCUBA) using the open-circuit principle has an inherent limitation for sustained hard work at any depth. Planning a SCUBA diving operation requires assessment of the likely gas consumption for the operation. This can vary greatly, depending on the diver, the task and the environment. For diving at greater depths, it becomes increasingly difficult to make reliable assessments of gas consumption under varying work conditions and, therefore, of gas reserve left in the cylinders.

(b) Surface-supplied systems do not require the same extent of gas consumption assessment as the supply is usually not limited and these systems are therefore more applicable to deep dives or dives requiring hard work.

Certain limitations have been placed on the use of SCUBA. These limitations are listed in Clause 6.1. Due to the risk of entrapment and entanglement associated with nets, SCUBA is not considered appropriate for the vast majority of diving work performed in the tuna farming industry.

3.2 SURFACE CONDITIONS In planning a diving operation, careful consideration shall be given to the surface conditions that will be encountered at the scene of the operation. These conditions include the state of the sea, weather, visibility, tide, currents, water temperature, presence of ships or other craft, and any other surface conditions that could affect the operation. Should adverse conditions develop while the dive is underway, consideration should be given to aborting the dive.

Diving operations shall not be undertaken in rough seas, unusual tides or currents, or other adverse conditions unless the supervisor and the diver consider that the diver's safety will NOT be jeopardized.

3.3 DEPTH OF WATER Before diving operations are commenced at any site X

(a) the maximum depth of water at the dive site shall be ascertained by reliable means; and

(b) the maximum depth at the greatest tide during the particular work period shall be taken into account for the planning of the dive.

3.4 COMMUNICATIONS: There shall be some form of effective communication between the diver and the diver=s attendant. It should be by -

(a) reliable audio communication; or

(b) a lifeline with an established signalling system as given in Appendix F; or,

(c) any other system that results in the diving operation having a level of safety not less than that provided by systems incorporating items (a) or (b).

In all but low risk activities voice communications should be provided. Voice comminations should be used for the following operations:

1. Where winches, hoist and cranes are used.
2. Work involving the use of powered equipment, e.g. net cleaning using water jets or suction pumps.
3. Work where there is a significant risk of entanglement or entrapment.
4. Live predator removal.
5. Where visibility is low.
6. Diving when underway (live boating).

Every decompression dive should have a dual system of comminations, one system should provide voice communication.

NOTE:

1. In addition to providing an increased level of safety, audio (voice) communication allows for more sophisticated 2 way communication between the diver(s) and those on the surface. The resultant increase in diving efficiency may lead to a reduction in the time required to perform the task. This reduction in exposure (bottom time and/or number of ascents) may lead to a further increase in safety. Audio communication should therefore be considered the preferred means of communication for all but low risk diving tasks.

2. When selecting voice communication equipment consideration should be given to selecting systems which provide for diver to diver and diver to surface communication. This is particularly important where it is intended that the standby diver will also be in the water.

Where audio communications are not provided additional precautions may be required.

3.5 WATER TEMPERATURES The temperature of water at the dive site shall be ascertained and suitable diving plant or equipment shall be used to maintain the diver at a safe temperature. All divers should wear suitable thermal protection when undertaking diving operations.

3.6 PLANT AND EQUIPMENT X GENERAL

3.6.1 Type of equipment The diver, diver's attendant, and supervisor shall know the capabilities and limitations of any equipment they use.

Equipment shall not be altered, modified, or changed in any way that might impair the safe and efficient operation of the equipment.

Where winches, hoists and cranes are used, or are intended to be used, in or in connection with diving operations, they shall comply with the requirements of the relevant regulatory authorities.

Equipment shall comply with the relevant requirements of this Section and with those of Sections 4, 5 and 6.

3.6.2 Selection Both the employer and the supervisor shall ensure that both the type and the capacity of the equipment are suitable for the job, that the equipment is properly maintained and serviced, and that it is kept in a safe working condition.

3.6.3 Inspection In addition to the above X

(a) the diver shall personally check equipment to ensure its working efficiency before a dive commences;

(b) pre-dive equipment checks detailing essential check points shall be provided at each diving location (copies of such checklists should appear in the Diving Operations Manual see Appendix J); and

(c) no person shall require a diver to use any diving plant or equipment if it can be demonstrated that such plant or equipment is not in a safe working condition.

3.6.4 Maintenance and servicing The following requirements apply to the maintenance of diving equipment:

(a) All underwater equipment shall be cleaned with fresh water, drained and dried before being stored in accordance with Clause 3.6.5. Where appropriate, equipment such as full face masks etc should be thoroughly cleaned using a suitable anti-viral and anti-bacterial disinfectant. Care should be taken when selecting disinfectants to ensure that they are compatible with the materials being cleaned.

(b) All diving equipment shall be kept maintained in good and safe condition and in efficient working order.

(c) Every gauge which is used for measurement of the diver's depth shall be checked at intervals not exceeding three months and, if found to be in error, be adjusted to read correctly, or suitably marked to show the amount of error (see also Clause 3.16.2).

(d) All maintenance shall be conducted in accordance with the manufacturer's instructions.

3.6.5 Storage All diving equipment when not in use or required for immediate use shall be stored in a room or locker not used for the storage of any other goods or materials which may be detrimental to the diving equipment.

3.7 MEDICAL AND TREATMENT EQUIPMENT

3.7.1 General The Approved Code of Practice for Occupational Health and First Aid in the Workplace provides advice on the contents of first aid kits. In addition to these general provisions, the following are needed for all dive operations dive operations:

(i) a resuscitator capable of providing an inspired oxygen concentration of 100% to a patient who is either breathing spontaneously or requiring artificial ventilation;

(ii) sufficient oxygen to supply the resuscitator, taking into account the location of the dive site and access to medical facilities;

(iii) bandages and dressings suitable for arresting major bleeding and scissors or shears suitable for cutting diving suit material; and

(iv) airways suction and other facilities recommended by the Hyperbaric Unit of the Royal Adelaide Hospital or a medical practitioner qualified and experienced in diving medicine.

Where required by Clause 4.1, an operational compression chamber complying with Clause 4.2 shall be available, as well as an additional first aid kit complying with Clause 4.3.

NOTE: See Appendix C for therapeutic recompression treatment for decompression sickness and air embolism.

3.7.2 Emergency procedures The emergency procedures developed as part of the diving operations manual should include:

- the first aid equipment required at the dive operation by dive medical technicians; and
- the required contents of the first aid kit.

Advice on any additional equipment (to that described above) which should be provided, given the location and nature of diving work, should be obtained from the Hyperbaric Medicine Unit of the Royal Adelaide Hospital.

3.8 DIVING VESSEL REQUIREMENTS

3.8.1 General Diving operations shall be conducted only from the deck of a platform, or a vessel, or another structure that X

(a) is safe and suitable for the purpose;

(b) enables the equipment necessary for the diving operations to be stored;

(c) has suitable means by which the diver can enter and leave the water; and

(d) has means to recover an injured diver from the water.

Diving shall not be conducted from a vessel under way unless adequate precautions, e.g. guarding of propeller, have been taken.

NOTE: Attention is drawn to the surveying and certification of craft, required by various regulatory authorities.

3.8.2 Signals When diving from a vessel, the International Regulations for Preventing Collisions at Sea (1972) or local harbour rules shall apply. The appropriate signals shall also be displayed when diving from a wharf, jetty or slipway.

3.8.3 Communication equipment (vessel-to-vessel and vessel-to-shore) Adequate vessel-to-vessel and vessel-to-shore communication facilities shall be provided to cater for emergencies (see also Clause 3.4).

3.9 DECOMPRESSION TABLES

3.9.1 Dive planning All diving shall be undertaken using recognised decompression procedures (including the figure below) and is to be planned to minimise the risk of decompression illness.

In planning dive operations all necessary steps must be taken to identify the risks associated with decompression illness. Where the risk assessment (carried out as part of the dive planning process) identifies factors that may increase the risk of decompression illness (e.g. hard work and cold water) the supervisor must ensure that appropriate measures are taken to minimise the risk, including setting conservative dive times.

Work procedures should be planned so:

(a) the diver always dives to the deepest depth first;

(b) the first dive of the day is the deepest; and

(c) no dive is followed by a deeper exposure at any time during one working day.

It is important that the diver=s fitness to dive be checked during the planning process (see paragraph 2.6.2) as there may be personal factors, such as the diver having a cold or being aggravated, that may increase the risk of decompression or other diving related illnesses and impact on the overall safety of the dive operation.

3.9.2 Decompression diving No dive should be planned so as to require decompression of the diver.

3.9.3 Table variations Dives beyond 30m (100 ft) are not covered by this Code (see Paragraph 1.1)

3.9.4 Dive figure The figure below details the maximum depth and time limitations for tuna farm diving and are to be used in conjunction with the DCIEM tables where repetitive dives are planned.

The use of this figure does not prohibit employers setting more conservative standards, for example more days off diving, nor does it remove the need as part of the risk assessment process (when planning the dive operation) to consider whether a more conservative dive exposure should be set given the circumstances of the particular dive. The use of safe operating procedures for regularly performed working tasks will further assist in this process.

Columns 6 and 7 of the figure are only to be used if the time necessary for the transportation of a diver, taken from the time the diver leaves the water to his or her recompression in the chamber, would not exceed two hours. If a retrieval time is likely to exceed two hours, then Column 8 is to be used.

3.9.5 Diving outside of the schedule Where during the conduct of a diving operation, the limits of schedule 3.9 are exceeded the DCIEM tables are to be used (see Appendix B).

3.9.6 Multiple ascent diving Multiple ascent diving can increase the risk of decompression illness. Every effort should be made in the development of work procedures and dive planning to eliminate or minimise the need for multiple ascents.

The ability of the dive supervisor to monitor the depth of the diver during the progress of the dive is also crucial to detecting any unplanned ascents and descents (see paragraph 5.6.8.2).

An ascent starts when leaving the bottom or the deepest part of the dive after which a descent is not to be conducted until the minimum 30 or 45 minute surface interval has been taken.

Once the diver has reached the maximum depth and has commenced an ascent, all movement will be to a lesser depth. If for any reason the diver wishes to move to a greater depth, after they have commenced an ascent, this can only be done if authorised by the dive supervisor and is only to be done in cases of an emergency.

3.9.7 Use of pure oxygen in decompression tables Where pure oxygen is being employed as an element of a decompression table, the requirements specified in Paragraph B2.4 of Appendix B apply.

3.9.8 Breaks from diving In addition to the surface intervals detailed in figure 3.9:

(a) the minimum time between the last dive on any day and the first dive the next day is 18 hours;

(b) in any seven day period divers must have at least two consecutive days where they do not dive at all, with no more than five consecutive diving days; and

(c) a diver should not undertake any other diving during their rest days and any other dives conducted during this period are to be reported to their dive supervisor so this can be taken into account when planning the diver=s next dive.

NOTE: See also Section 3.17 Before and After Travel.

3.9.9 Hot showers Hot showers are not to be taken immediately after diving because of the increased risk of decompression illness. If a diver experiences cold conditions during a dive, they should wait a minimum of six hours before taking a hot shower. Warm showers are permissible.

3.9.10 Alcohol and drug consumption No alcohol is to be consumed withing eight hours before diving or for two hours following diving. Each member of the dive team shall, so far as is reasonable, ensure that he or she is not by the consumption of alcohol or a drug, in such a state as to endanger his or her own health and safety at work or the health and safety of another person. (See paragraph 2.6.2).

FIGURE 3.9 DIVE DEPTHS AND LIMITS

NOTE: WHERE MORE THAN ONE DIVE IS PLANNED THE DCIEM TABLES ARE TO BE USED TO CALCULATE THE MINIMUM SURFACE INTERVAL AND MAXIMUM DIVE TIME FOR EACH DIVE.

					Retrieval within 2 hours	**Retrieval within 2 hours**	**Retrieval within 6 hours**
1 Maximum Depth of Dive	**2 Maximum No. Of Dives per Day**	**3 Minimum Surface Intervals (Min)**	**4 Maximum Dive Days in Succession**	**5 Minimum Days off Diving in Succession**	**6 Maximum Accrued Total Bottom Times per Day**	**7 Single Dive Maximum Duration**	**8 Maximum Accrued Total Bottom Time and Single Dive Duration**
9 metres	4	30	5	2	180 minutes	180 minutes	130 minutes
12 metres	3	30	5	2	150 minutes	110 minutes	100 minutes
15 metres	3	30	5	2	75 minutes	60 minutes	70 minutes
18 metres	3	45	5	2	60 minutes	50 minutes	40 minutes
21 metres	3	45	5	2	45 minutes	35 minutes	25 minutes
24 metres	2	45	5	2	30 minutes	25 minutes	15 minutes
27 metres	2	45	5	2	25 minutes	20 minutes	10 minutes

Note:

1. In determining the dive exposure consideration needs also to be given to the limits set out in Section 4 covering compression chamber availability.
2. When hard physical work is carried out the diver is at greater risk of developing decompression sickness. Due to the type of work and conditions associated with tuna farm diving, special attention is drawn to paragraph B2.3 in Appendix B.
3. The maximum number of dives and maximum accrued total bottom time for each day is determined in columns 2, 6 and 8 of the table above. These figures are derived from the first dive, i.e. if the first dive is to 18 metres then the maximum number of dives is three no matter what shallower depth is attained during the second or subsequent dive.
4. Do not repeat dives that have the same dive profile and/or surface interval in table B1 of the Code more than twice in one succession because the repetitive dive table B3 (a) and B3 (b) are not designed to cater for such exposures. See B4.5 (e) of the Code.

3.10 LIFELINE Where required, the form and connection of a lifeline shall comply with one of the following:

(a) A separate line constructed of cordage with a safe working load of not less than 4.5 kN and with a diameter of not less than 8 mm.

(b) A combined communication line and lifeline complying with Item (a) above.

(c) The surface-supply air hose (see Clause 3.11.2.6) and its attachment to the harness.

NOTE: See Clauses 5.4 and 6.4.

3.11 AIR BREATHING APPARATUS

3.11.1 Design and construction Air breathing diving apparatus shall be designed and constructed from non-toxic, corrosion-resistant materials, and shall X

(a) provide the wearer with respirable air at a suitable pressure and volumetric flow rate at all times during the effective life of the apparatus;

(b) prevent ingress of water to the breathing circuit;

(c) prevent leakage from the breathing circuit except through the exhaust valve(s);

(d) ensure that couplings provide a secure and airtight joint and that when such couplings are detached any sealing washers are retained in position;

(e) ensure that component parts likely to require maintenance are readily detachable without risk of accidental disconnection;

(f) not unduly impede the wearer when swimming and working under water; and

(g) ensure that the method of fastening the equipment to the wearer is secure in action and, for self-contained apparatus (open-circuit type), permits quick release in cases of emergency.

3.11.2 Requirements for component parts

3.11.2.1 *General* Material which may come in contact with the skin shall be non-staining, soft, pliable and not likely to cause skin irritation.

Unless otherwise specified by the manufacturer, each component part of the air breathing apparatus shall have a storage life of at least five years when properly stored and maintained.

NOTE: Recommendations for the storage of vulcanized rubber are given in ISO 2230.

3.11.2.2 *Face mask or helmet* Masks and helmets shall be designed and constructed so as to X

(a) provide a watertight and gastight seal;

(b) enable all the component parts to withstand, without failure or displacement, a pressure of 15 kPa above or below ambient pressure;

(c) cause the least possible interference with vision;

(d) minimize build up of carbon dioxide gas (CO_2);

(e) be purgable of water; and

(f) for full-face masks and helmets, incorporate a valve to prevent the ingress of moisture into the breathing circuit.

A full-face mask shall cover the eyes, nose and mouth and include a facility for ear-clearing. The mask shall be secured in position by means of a head-harness or may form part of a helmet supported on the wearer's head or shoulders by suitable means.

The safety face-plate shall be capable of meeting the impact test for eye protectors specified in AS 1337.

3.11.2.3 *Mouthpiece* Where a mouthpiece is incorporated, it shall be designed to meet the following requirements:

(a) Provide a watertight and airtight seal when held firmly and without undue discomfort in the wearer's mouth.

(b) Prevent closure of the aperture of the mouthpiece by normal mouth pressure.

(c) Include a flange to be held between lips and teeth to facilitate a watertight and airtight seal, and lugs to be held between the teeth to prevent the mouthpiece from slipping from the wearer's mouth.

NOTE: This requirement does not apply to the mouthpiece in a helmet designed to free-flow according to the operator's demand.

3.11.2.4 *Head-harness and safety strap* The head-harness and safety strap shall be of webbing, strip rubber or other suitable material, which shall be not less than 15 mm wide. Provisions shall be made to prevent the slipping of the adjustment buckles when the harness straps are wet.

3.11.2.5 *Breathing tubes for twin hose systems* Breathing tubes (see Clause 1.3.2) shall be flexible and their bore diameter shall be not less than 19 mm or be of equivalent cross-sectional area. They shall be of sufficient length to permit free movement of the head

and arms without the bore of the tubes being restricted or closed off by kinking or by chin or arm pressure, and shall be securely attached to the mouthpiece.

3.11.2.6 *Diver's hose* Hose for use in diving shall be of one continuous length, designed especially for the conditions experienced in such use, and shall be manufactured, maintained and tested in accordance with the following:

(a) A hose shall not be used in diving operations for conveyance of the breathing medium at a pressure exceeding one quarter of the burst pressure as specified in Item (b).

(b) The burst pressure of a hose shall be defined as the pressure at which that hose, or another hose similar to it in all respects, has burst when tested at maximum operating temperature.

(c) A hose assembly shall not be used in diving operations for conveyance of the breathing medium unless X

(i) it has been tested not more than 12 months prior to those operations at a pressure equal to 1.5 times its maximum operating pressure;

Note: Where subjected to frequent use or harsh conditions more frequent testing may be required.

(ii) it has a minimum internal diameter of 10mm and is kink resistant;

(iii) it is capable of carrying the breathing medium at a flow rate required in the operations;

(iv) the hose and its couplings are in alignment;

(v) the couplings are not scoured or substantially corroded;

(vi) the couplings contain no damaged threads;

(vii) the hose fittings are made of brass, stainless steel, Monel metal or other non-corrosive material;

(viii) the fittings connecting the hose to diving equipment are incapable of accidental disengagement or loosening; and

(ix) it is, where practicable, of such diameter and has such type of connection as will minimize the possibility of wrongly connecting hoses and fittings.

3.11.2.7 *Inle*t *and exhaust valves* Valves shall be designed and constructed so that X

(a) any leakage will not exceed the limits prescribed in Item (i);

(b) adequate protection is provided against mechanical damage;

(c) they are capable of easy maintenance;

(d) they are fitted in, or as close as is practicable to, the full-face mask or the mouthpiece;

(e) they will not be affected by any heat or moisture to which they are likely to be exposed while stored or in use; and

(f) where manually operated, they are easily operated.

The shut-off and flow characteristics of the valves shall be as follows:

(i) The total air leakage shall not exceed 0.03 L/min when tested with air at a constant suction head of 35 mm water. During this test the valve and its seating shall be wet.

(ii) The resistance to a continuous stream of air through the valve assembly shall not exceed X

(A) 19 mm water when the air flow is 85 L/min; and

(B) 57 mm water when the air flow is 170 L/min.

The foregoing requirements apply to the whole valve assembly including all the parts through which the air passes. Where a valve is duplicated in the apparatus, the requirements apply to the valves in combination and not to each valve separately.

3.11.2.8 *Demand air supply device* The demand air supply device shall consist of a pressure-reducing system and means of exhausting excess pressure from the breathing circuit. The design shall be such that the device is adequately protected against damage and its efficiency is not impaired by any heat variations or moisture likely to be encountered in use.

Where the device includes an adjustable reducing valve, the valve shall incorporate a suitable locking device to prevent the adjustment from being altered accidentally, and the valve assembly shall comply with the requirements of Clause 3.11.2.7.

3.11.2.9 *Cylinders* Cylinders for compressed air shall comply with the specifications listed in AS 2030.1 or AS 2705 as appropriate.

Cylinders shall be durably marked with the word `AIR' in letters not less than 50 mm high. The word `AIR' shall be in a contrasting colour to the body of the cylinder or the cylinder shall be colour coded in accordance with AS 1944.

3.12 DIVING SUIT OR DRESS Diving suits and other diving dress shall be a suitable fit and designed to maintain the diver at a comfortable temperature during diving operations.

3.13 WEIGHT BELT OR WEIGHTS Any weights or weight belt worn by the diver shall be fitted with a reliable release mechanism which cannot be accidentally released, but which can be readily operated by the diver under water. Weights and weight belts shall be worn in such a manner that when released, they will not foul any other piece of the diver's equipment. In addition, the weights shall be attached in such a manner as not to slide and foul the release mechanism.

3.14 WEIGHTED BOOTS Weighted boots worn by divers shall be of a type suitable for use in diving work and fitted with reliable release fastenings which can be readily operated by the diver under water.

3.15 DIVER'S KNIFE Every diver shall carry a knife at all times when engaged in a diving operation or under water. The knife shall be worn in such a position that it will not foul any discarded equipment, e.g. released weights.

3.16 AIR SUPPLIES

3.16.1 Purity of air Air used in diving or habitat work shall X

(a) have no objectionable or nauseous odour;

(b) contain not less than 20% and not more than 22% by volume of oxygen;

(c) contain not more than 11 mg/m^3 of carbon monoxide at 15EC and 100 kPa (10 p.p.m. by volume)

(d) contain not more than 900 mg/m^3 of carbon dioxide at 15EC and 100 kPa (480 p.p.m. by volume);

(e) for high pressure cylinders, contain not more than 100 mg/m^3 of water at 15EC and 100 kPa (130 p.p.m. by volume);

(f) contain not more than 1 mg/m^3 of oil at 15EC and 100 kPa when sampled from a cylinder filled to a pressure of at least 12 MPa;

(g) where supplied from a compressor, not be used for diving operations unless the compressor has, within the three month period preceding the operations and every three months during the operation as appropriate, undergone a test to ensure that the compressed air satisfies the requirements specified in Items (a) to (f) inclusive; and

(h) for all air testing equipment, the manufacturer's instructions shall be strictly followed.

Additional requirements for compressor air supplies are specified in Clause 5.5.

3.16.2 Pressure gauges

3.16.2.1 *Gauge calibration* A gauge used in, or in connection with, diving operations shall X

(a) if used to measure the depth of the diver or the pressure in a deck compression chamber, be calibrated either in feet head of sea water (showing clearly each two feet) or metres head of sea water (showing clearly each half metre);

(b) if used to measure the depth of the diver or pressure inside a deck compression chamber, be checked by a master gauge upon arrival on site, at least once in each period of three months, and whenever it appears to be incorrect;

(c) if it is a master gauge, be calibrated at least once in each period of 12 months by test; and

(d) if it is a deadweight tester, be verified under and in accordance with the Weights and Measures (National Standards) Act 1960X1966 of the Commonwealth of Australia, or by a deadweight tester or gauges for which an endorsed test certificate is currently in effect.

3.16.2.2 *Deadweight tester* A deadweight tester used for checking a gauge in accordance with Clause 3.16.2.1 shall be produced for inspection by the relevant regulatory authority when demanded.

3.16.2.3 *Gauge accuracy* A gauge used in diving operations X

(a) for measuring depths less than 30 m, shall have an accuracy within 1% of the maximum scale reading;

(b) with a maximum scale reading not exceeding 200 m for measuring depths exceeding 30 m and less than 200 m, shall have an accuracy within 0.5% of the maximum scale reading; and

(c) in any other case, shall have an accuracy within 2.5% of the actual condition it is measuring.

3.16.3 Pneumatic tools Where divers are using pneumatic tools, air for these tools shall be taken from a source entirely separate from the divers' air supply. Notwithstanding the above requirement, a purpose designed system for the inflation of small parachutes can be run off the diver=s air supply providing the integrity of the diver=s air supply is assured.

3.16.4 Air compressor systems Air compressors used to supply air for diving operations shall comply with the relevant requirements in Clause 5.6.

3.16.5 Emergency air supplies Emergency air supplies shall be of sufficient capacity for the diver to return to the surface.

In self-contained breathing apparatus, any emergency supply used shall be capable of being brought into operation manually when the warning device operates.

3.17 DIVING BEFORE OR AFTER TRAVEL

3.17.1 Diving after travel The diver shall have had adequate rest before diving.

3.17.2 Travel after diving Altitude exposure after diving is a potent precipitator of decompression sickness. Table 3.1 should be applied to the diver after any dive with regard to air travel or road travel over mountains.

NOTE: In pressurized aircraft, the altitude referred to is the effective altitude within the cabin. Commercial aircraft are usually pressurized to an effective cabin pressure of 2400 m or less.

3.17.3 Travel after decompression illness After decompression illness, a diver should not be exposed to greater than 300m effective altitude for seven days.

NOTE: The restrictions given in Table 3.1 are for routine diving operations. Decompression illness risk varies substantially with differing dive profiles, and data regarding the risks associated with altitude exposure after diving is limited. The advice of a medical practitioner experienced in underwater medicine is recommended where altitude exposure after diving is required.

TABLE 3.1
MINIMUM DELAY BEFORE EXPOSURE TO ALTITUDE

Altitude (m)	Minimum delay before exposure to altitude (h)		
	Category of dive (see Legend		
	1	2	3
0-150	Nil	Nil	2
150-300	Nil	2	4
300-600	2	12	24
600-2400	12	24	48
Greater than 2400	24	48	72

LEGEND:

CATEGORY 1 = Single dive to □50% of no-decompression limits, with no decompression or repetitive dives in the previous few days

CATEGORY 2 = Routine no-decompression diving;
single decompression dives.

CATEGORY 3 = Multiple decompression dives; or extreme exposures; or omitted decompression or other adverse events.

3.18 PRE AND POST DIVE ACTIVITIES

3.18.1 Hard physical activities pre or post dive, may increase the risk of developing decompression illness. This should be considered when planning work. In particular post dive activities for divers should be limited to light duties for the remainder of the working day. Light duties may include maintenance of equipment, cleaning and clerical work. Prohibited duties include heavy lifting and other strenuous activities.

SECTION 4 COMPRESSION (RECOMPRESSION) CHAMBER AND CHAMBER EQUIPMENT

4.1 AVAILABILITY OF COMPRESSION CHAMBER For all diving operations, compression chamber support is required. In the absence of other requirements (e.g. diving regulations covering construction diving work) the minimum level of support to be provided to diving operations conducted in the tuna industry is as follows:

(a) *Chamber to be available on site:* An operational twin-lock compression chamber shall be located on site when X

(i) the depth of diving exceeds 30 m; or

(ii) if the maximum accrued bottom time exceeds the times set in level 2 of table 4.1; or

(iii) decompression stoppages are required for a dive; or

(iv) free or buoyant ascent training is being conducted; or

(v) the nature of the work or local conditions creates a significant risk of emergency ascent.

NOTE: On site means at the dive control position or, if this is impossible, close enough to the dive control position to ensure that a diver could be recompressed within the chamber within 5 min of leaving the dive depth.

(b) *Chamber not required on site:* For diving operations which are not subject to the conditions described in 4.1(a), a procedure for transporting a diver to the nearest acceptable and available compression chamber shall, in consultation with the Hyperbaric Medicine Unit of the Royal Adelaide Hospital, be set out and communicated to all parties involved, prior to the commencement of the diving operation. The time necessary for the transportation of a diver, is taken as the time from when the diver leaves the water to his or her compression in the chamber, and should not exceed:

(i) 2 hours for dives where the maximum accrued bottom time exceeds Level 1 but is less than or equal to Level 2 of Table 4.1; and

(ii) 6 hours for dives where maximum accrued bottom time is less than or equal to Level 1 of Table 4.1.

NOTES:

1 Attention is drawn to the need for compression chambers to be provided wherever treatment of decompression illness is likely. There are many variable physiological and psychological factors affecting successful decompression, and the specification of specific depths and bottom times at which compression chambers should, as distinct from shall, be provided will vary from one situation to another. Likewise the risk of uncontrolled ascent, and the associated risk of decompression illness, will vary with the type of diving, the equipment used, water conditions and the experience of the diver.

2 Multiple ascents, multiple repetitive dives, prolonged dive times, cold water and hard work are well documented risk factors for decompression illness and, where these are planned or likely, the level of compression chamber support should be increased appropriately.

3 In addition to the safety aspects, it should also be borne in mind that a compression chamber allows greater flexibility of decompression profiles, thereby maximizing the optimum exposure/bottom time equation.

4 Although decompression illness can arise after any dive, even within the limits of typical decompression tables, at depths of more than 20 m the relative risk of such decompression illness involving the spinal cord increases. The prompt treatment that can be provided by a chamber located at the dive control position makes recovery from spinal cord decompression illness more likely and usually more complete. At depths of more than 30 m, the likelihood of error or misjudgment contributing to an accident is increased by nitrogen narcosis, and decompression illness risk also rises further.

TABLE 4.1
LIMITS FOR COMPRESSION CHAMBER AVAILABILITY LEVELS

Maximum depth of dive	Maximum bottom time min	
m (ft)	Level 1	Level 2
3 (10)	240	no limit
6 (20)	240	240
9 (30)	130	180
12 (40)	100	110
15 (50)	70	75
18 (60)	40	50
21 (70)	25	35
24 (80)	15	25
27 (90)	10	20
30 (100)	8	15
	Less than or equal to Level 1: max. retrieval 6 hours	Greater than level 1 and less than or equal to Level 2: max. retrieval 2 hours
		Greater than Level 2: A chamber required on site

4.2 CHAMBER REQUIREMENTS

4.2.1 General The design, manufacture and testing of the chamber shall be in accordance with AS 1210, or the ANSI/ASME Boiler and Pressure Vessel Code as amended from time to time, and shall be approved by the regulatory authority for a minimum working pressure of 500 kPa.

NOTES:

1 Some regulatory authorities may require approval for the design of the compression chamber as well as the compressed air cylinders.

2 Single lock chambers are not considered suitable for treatment purposes, or for routine surface decompression schedules, and are designed primarily for emergency transport. However, where such chambers are used on a site, they should be fitted with a male lock-on device or transfer section capable of attachment to a larger chamber suitable for treatment (see Clause 4.2.2(u)), and be part of an integrated procedure for transfer-under-pressure to a dedicated twin-lock chamber.

4.2.2 Fittings and services The following requirements apply to the construction, fittings and services of chambers:

(a) The inner compartment of the chamber shall be sufficient in dimensions and internal layout to provide a suitable bunk for the diver in medical care, adequate space for an attendant to lie down and room for a third person to move about to provide medical treatment.

(b) At least two pressure-proof observation portholes shall be provided, sufficient to view all parts of the chamber.

NOTE: Where acrylic portholes are used, consideraton should be given to the effects of heating from external lighting sources.

(c) Air and oxygen shall be supplied to the chamber from separate external sources.

(d) Gas cylinders shall not be installed in the chamber at any time except as part of the required firefighting system.

(e) Chambers shall be equipped with an oxygen supply system incorporating an exhaust gas overboard dump system, and any high pressure oxygen supply shall be reduced to not more than 4200 kPa at the source.

(f) A monitoring device shall be provided to determine the oxygen concentration within the chamber.

(g) Effective means of audio intercommunication between persons inside and outside the chamber shall be provided.

NOTE: A secondary means of attracting attention, e.g. wooden mallet, in case of audio failure should also be provided.

(h) Suitable noise suppression or protection shall be provided where the average noise level in a chamber exceeds 85 dB(A).

(i) Only lubricants approved for use with oxygen shall be used on oxygen cylinders and associated fittings. No petroleum-based products shall be used.

(j) Flammable material shall not be stored or used inside the chamber.

(k) Paintwork in the chamber shall be as near as practicable to non-toxic, inert to oxygen and non-combustible.

(l) All pipe penetrations shall have manually operated override valves fitted internally and externally to the chamber.

(m) All pipe penetrations that can allow air flow out of the chamber, e.g. exhaust, equalization, sample or gauge lines, shall have an end fitting inside the chamber to prevent objects, including body parts, being sucked onto or into such fittings.

(n) The piping to and from a chamber shall be designed so as to ensure that X

  (i) oxygen delivery pressures to a chamber are suitably low and compatible with the design of the piping system in which the oxygen is delivered;

  (ii) valving and fittings used on oxygen lines are suitable and safe for the purpose;

  (iii) oxygen lines and fittings are kept clean and free from oil, dirt or other particulate matter; and

  (iv) all valves fitted to oxygen lines are of a rising stem design.

(o) The pipework, including all connecting pipework, shall be of such a size as to permit pressurization to 500 kPa at a rate of not less than 100 kPa/min.

NOTE: To achieve this rate, the inner lock may be pressurized above the required decompression schedule and used to supplement the pressurization rate by means of an equalizing valve.

(p) Effective means of shading or thermal insulation shall be provided.

(q) Electrical lighting shall be provided and such lighting or equipment should, wherever practicable, be external from the chamber.

NOTE: Where electrical lighting or equipment is within the chamber it should be `flame (explosion) proof' or `intrinsically safe' in accordance with AS 3000.

(r) Electrical wiring shall comply with the relevant requirements of AS 3000.

(s) A suitable caisson gauge calibrated in equivalent water depth (metres head of sea water (MHSW) or feet head of sea water (FHSW)) shall be provided inside the inner lock.

(t) A copy of the relevant decompression schedules utilized shall be provided.

(u) A worksite chamber shall be capable of transfer-under-pressure operations to enable transfer of a diver for more extensive treatment. The preferred types of TUP systems are outlined in Appendix I. This Item applies on publication of this Standard for chambers manufactured, imported or sold after the publication date and from a date 12 months after publication for other existing chambers.

In addition to these requirements, the following recommendations are made concerning the construction, fittings and services of chambers:

(A) A suitable lock should be fitted to the inner lock for transferring equipment and supplies, e.g. medical supplies, while the inner lock is under pressure.

(B) At least two hooks should be provided for support of intravenous fluid containers.

(C) A number of access spaces should be provided within the chamber for spare fittings, supplies, and other provisions or equipment.

(D) A through-hull pressure tight penetration for the connection of an electrocardiograph (ECG) and monitoring equipment should be provided.

(E) Firefighting equipment should be provided which is non-injurious to persons, and is suitable for hyperbaric use.

NOTE: See also Clause 4.2.4.

4.2.3 Venting of chamber The chamber shall be capable of being vented with air at a rate comparable with the Standard decompression tables.

Whenever oxygen is used inside the chamber, it is of the utmost importance that the oxygen content not exceed 25% by volume.

4.2.4 Emergency procedures and equipment Fire drills shall be carried out at regular intervals.

NOTE: The chance of ignition is increased with a rise in temperature or pressure. Possible sources of ignition in a chamber are sparks (electrical, electrostatic, impact), hot surfaces (shear forces, electrical faults, friction), hot gases (compression), and naked flames (matches, lighters).

Emergency procedures best suited to the needs of the individual facility shall be established, including procedures to ensure continuity of treatment. All personnel shall become thoroughly familiar with these procedures and the methods of implementing them.

All personnel shall become familiar with emergency equipment, its purposes, its applications, operations and limitations.

4.2.5 Facilities at control panel The following facilities shall be made available at the compression chamber control panel:

(a) Pressurization control valves.

(b) Pressure vent valves.

(c) Pressure (depth) gauge.

(d) Time clocks.

(e) Audio communication facilities.

(f) Provision for the control of appropriate breathing media.

(g) Sample line facility at the panel.

4.3 MEDICAL EQUIPMENT

4.3.1 General First aid and medical equipment for the treatment of diving injuries shall be available, and shall include airways, a suitable resuscitator, a suction unit, bandages and dressings. Equipment for intravenous fluid administration and urinary catheterization shall also be available for use by qualified personnel.

NOTE: An example of a compression chamber medical kit is given in Appendix H.

4.3.2 Other equipment Equipment such as blankets, towels, urinals, and the like, for the comfort of divers undergoing recompression shall be provided.

4.3.3 Remote diving operations Where advanced medical/paramedical care is not readily available, suggested additional equipment should be ascertained from the medical practitioner advising the operation.

NOTE: See also Clauses 2.5 Dive Medical Technicians and 3.7 Medical and Treatment Equipment.

SECTION 5 PROCEDURES FOR SSBA DIVING OPERATIONS

5.1 GENERAL Diving operations utilizing surface-supplied breathing apparatus shall comply with the requirements of this Section in addition to the general and medical requirements contained in other sections of this Code.

5.2 PERSONNEL REQUIRED At every SSBA diving operation there shall be present sufficient personnel to ensure that diving is performed safely. The following minimum number of persons should be present:

(a) *Dive depths to 20 m* One supervisor, one diver, one diver's attendant, and one standby diver. (A minimum dive team of three persons.)

The supervisor may act as the diver's attendant or carry out other surface duties, but shall not be nominated as the diver or standby diver.

(b) *Dive depths of 20 m to 30 m* One supervisor, one diver, one diver's attendant, one standby diver, and one standby diver's attendant. (A minimum dive team of four persons.)

The supervisor may act as the diver's attendant or the standby diver's attendant or carry out other surface duties but shall not be attendant for both the diver and the standby diver.

Dive depths 20 - 24m For diving operations satisfying all of the following requirements a minimum dive team of three persons (as described in (a)) may be used:

Short duration inspection/mortality collection dives, where:

1. A single diver in the water only.
2. Audio communications are used for both the diver and standby.
3. The standby diver is to be fully dressed apart from having his or her mask on.
4. The dive duration does not exceed 15 minutes (level 1 in table 4.1).
5. The maximum depth of the dive not to exceed 24 metres.
6. The tuna pen is static (i.e. not under tow) and within 6 hours retrieval time of a recompression chamber.

For all other diving operations of 20m to 30m the minimum dive team is four.

(c) Where two or more divers are in the water at the same time, a diver's attendant shall be present for each diver.

NOTES:

1. Requirement (c) means that for dive depths to 20 m, where two divers are in the water at the same time in anything other than an emergency situation, then a dive team of more than three people is required.
2 Where two or more divers are in the water at the same time, a standby diver may not be necessary for each diver. The number of standby divers should be chosen after consideration of the dive profiles of each diver, their proximity to each other, the tasks at hand, and the water conditions and the ability to assist each other.
3 It could be that the number of personnel listed above may be inadequate for a particular diving operation, in which case the person in charge should take extra precautions.
4 See also Clause 1.4.

5.3 EQUIPMENT

5.3.1 General Equipment shall comply with the relevant requirements in Sections 3 and 4 in addition to the requirements in this Section.

5.3.2 Underwater air breathing apparatus For a surface-supply system, the underwater equipment used shall include the following:

(a) A surface-supply air hose for each diver, including a non-return valve located as close as possible to the diver, e.g. at the breathing medium inlet to the mask or mouthpiece or as an integral part of the components specified in Item (b).

(b) Any one of X

(i) a full-face mask or lightweight mask or helmet incorporating an oral/nasal inner mask or mouthpiece;

(ii) a half-face mask with a separate mouthpiece and a quick release safety strap capable of holding the mouthpiece securely in the mouth; or

(iii) an incompressible helmet.

(c) Inlet and exhaust valves.

(d) Either one of or a combination of X
  (i) a demand air supply device with or without breathing tubes (see Clause 1.3.2); or
  (ii) a free-flow air device.
(e) For demand breathing, breathing tubes or pressure pipe or pressure hose.
(f) An emergency air supply (see Clause 3.16.5).
(g) A harness to secure the air supply hose and the equipment to the diver.

5.4 LIFELINE No SSBA diving operation shall be carried out unless the diver is secured by a lifeline complying with Clause 3.10 and both the diver and the diver's attendant are thoroughly conversant with the agreed system of lifeline signals (see Appendix F).

The lifeline shall be independently attached in such a manner that the weights and other equipment can be readily discarded by the diver under water without fouling the lifeline.

5.5 COMPRESSED AIR SUPPLY

5.5.1 Sources Compressed air shall be supplied to the dive control panel or chamber control panel from a primary and auxiliary (secondary) air supply source. Each source may be either a power-driven compressor or a bank of compressed air cylinders.

The primary air supply and the secondary air supply shall comply with the appropriate requirements from the following:

(a) Where air is supplied from a compressor X
  (i) an air receiver shall be utilized (refer Clause 5.6.4);
  (ii) a non-return valve shall be fitted between the compressor and the receiver at the receiver end of the connecting pipe;
  (iii) a suitable filtering system to remove impurities shall be utilized; and
  (iv) a control system shall be provided (see Clause 5.6.8).
(b) When air is supplied at a pressure exceeding 2100 kPa, the pressure shall be reduced by an adjustable reducer able to match the diver's varying air requirements under all conditions. Where automatic reducers are used, they shall be capable of providing sufficient air to match X
  (i) the breathing apparatus to be used;
  (ii) extended hose lengths at shallow depths; and
  (iii) increased air consumption due to physical exertion.
(c) The air intakes of air compressors used to supply air to divers shall be so placed that the air supplied is not contaminated by engine gases, or by any dust, fumes, gases or other substances that may be detrimental to the health or comfort of the diver.

NOTE: Reducers shall be of a type not prone to freezing under normal operating temperatures and conditions.

5.5.2 Working pressure The pressure required to be delivered to the diver's breathing apparatus will depend on the type and depth of the dive.

For rigid helmet diving the pressure of the air shall be not less than 350 kPa or the diver's working depth in metres multiplied by 15 kPa, whichever is the greater.

Where a demand surface-air supply device is used, the minimum gauge pressure shall be 700 kPa plus 10 kPa for every metre of the diver's working depth.

NOTE: The value of 10 kPa does not make allowance for the effects of increased pressure on air density or the frictional losses of the hose.

5.5.3 Secondary air supply For all surface-supplied diving there shall be a secondary supply of air that will enable the diver to be brought back to the surface, making due allowance for a decompression schedule if this is applicable, should the primary source fail. Suitable forms of secondary supply are as follows:

(a) High pressure reservoirs attached to the diving control system and fitted with appropriate reduction stages.
(b) Additional primary units attached to the system as standby units. Such secondary supplies shall always be kept fully operational and connected to the dive or chamber control system.

Emergency air supplies worn by the diver shall not be used as a secondary air supply.

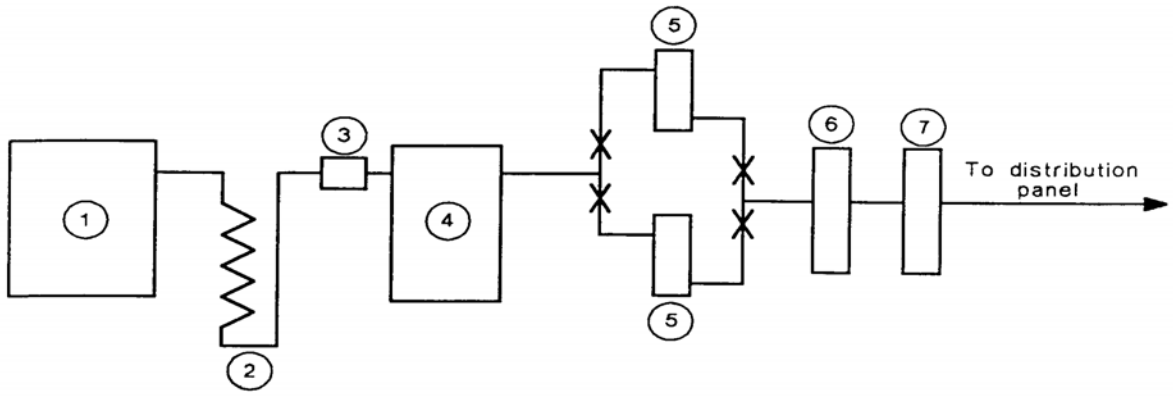
5.6 AIR COMPRESSOR SYSTEMS

5.6.1 General Power-driven compressor systems used for diving operations shall be of a type that will provide air of a purity complying with Clause 3.16.1. Air shall be delivered via a suitable receiver and cooling/drying/filtration system to ensure such purity.

NOTE: A typical system is shown in Figure 5.1.

LEGEND:

1 Compressor
2 Cooling coil



3 Pressure maintenance check valve
4 Receiver
5 Drying filter
6 Activated carbon filter
7 Particulate filter (may be combined or reversed with Item 6).

FIGURE 5.1 TYPICAL SYSTEM FOR SUPPLY OF AIR TO DIVERS FROM COMPRESSOR PLANT

5.6.2 Internal combustion engines Where compressors are driven by an internal combustion engine, every care shall be taken to prevent the compressor from sucking in the exhaust gases of the engine, either by extending the exhaust of the engine or the inlet of the compressor. The compressor manufacturer should be consulted concerning the maximum length and the minimum cross-sectional area of such an extension to avoid reducing the efficiency of the compressor. In addition, care must be exercised in determining the location of the compressor within the craft. (See also Clause 5.6.3.)

5.6.3 Avoidance of fumes Adequate precautions shall be taken to avoid intake of fumes from any source, particularly from welding, painting or cleaning operations, or from any other internal combustion machinery running in the vicinity of the compressor.

5.6.4 Air receivers An air receiver shall be incorporated in the compressor system. Air receivers and their fittings shall comply with AS 1210.

5.6.5 Non-return valves A non-return inlet valve shall be fitted between the compressor and the main receiver. The valve should, wherever practicable, be fitted immediately adjacent to the receiver.

5.6.6 Pressure relief devices A receiver shall be fitted with relief valves of large enough capacity to prevent the rated pressure of the receiver from being exceeded. In addition, compressors may be fitted with `off loading' mechanisms.

5.6.7 Filters and air dryers Any air supply system shall provide adequate filtration to eliminate oil, water and poisonous or noxious fumes from the air to the levels prescribed in Clause 3.16.1.

Materials used for drying, filtering or odour absorption shall not introduce undesirable contaminants into the air supply.

Drain cocks shall be provided to draw off any water and oil that may accumulate in filters. The drain cocks shall be arranged so that they may be operated while the filter is in use.

5.6.8 Control system

5.6.8.1 *Air control system* The air control system shall provide suitable means for measuring the pressures of the primary and secondary air supplies and the diver's air supply. It shall include control valves and appropriate check and non-return valves. These shall be firmly mounted and arranged so that they can be easily and rapidly observed and operated.

Means shall be provided so that all flexible connections such as divers' air lines and connections to the secondary air supply may be firmly lashed or connected to the control system in a way which prevents any strain coming on to the fittings or any possibility of the flexible connections blowing off.

NOTE: Control panels utilising a shared manifolded system suffer an inherent limitation in that when used to supply two (2) divers at one time both divers must share a common air supply.

Should the supply fail or become contaminated the divers= ability to render each other assistance may be compromised.

(Refer to 2.4(c))

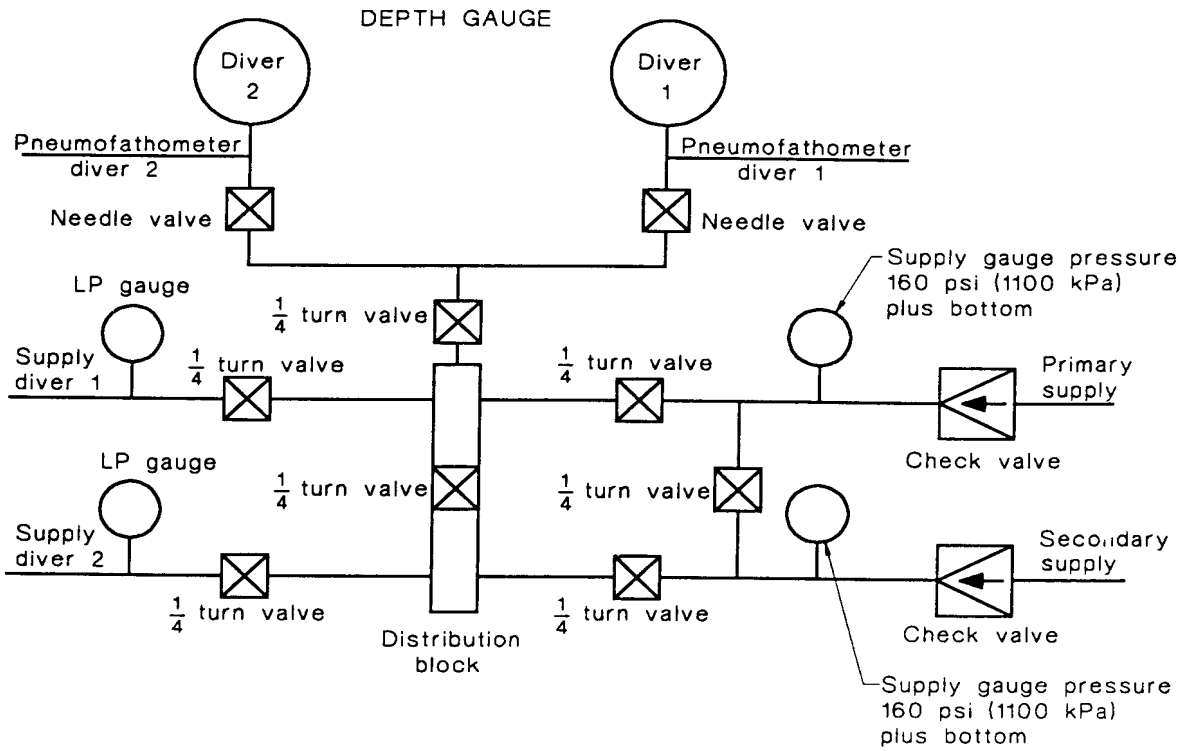
Where supplied from a compressor, air control systems having an internal design which connects the inlet supply to the outlet supply via a shared internal manifold, should not be used in support of two divers where both divers are in the water at the same time and acting as standby to each other.

5.6.8.2 *Diver depth monitoring system* A suitable system for monitoring the diver's depth shall be provided.

NOTE: Figure 5.2 provides a typical design for a control panel. Should individual operators decide to use panels without pneumofathometers the onus will be on them to demonstrate that they have an equally effective alternative system for monitoring the diver=s depth from the surface. For example voice communications and a system for monitoring the diver=s depth (to be noted on the employer=s dive sheet) as he/she moves from station to station can be used. If in water decompression stoppages are required, panels incorporating pneumofathometers or an equally effective means of accurately monitoring and controlling both the diver=s depth and rate of ascent, should be used.

5.6.8.3 *Control panel* A control panel such as that shown in Figure 5.2 is the preferred method for providing the required control system.

FIGURE 5.2 TYPICAL CONTROL PANEL



5.6.9 Supply lines The supply line between the compressor and the receivers shall be either permanent pipe, or high quality hose with external grade protection. Air hose of the type used for pneumatic tools shall not be used as a supply line.

All supply lines shall be located or guarded so that they are protected against mechanical damage, fatigue and vibration.

5.6.10 Maintenance Compressors and their prime movers should at all times be strictly maintained and operated in accordance with the manufacturer's recommendations. Manufacturer's recommendations for types of lubricating oils suitable for air compressor systems for diving purposes should be strictly adhered to. The air filters on the intake and delivery sides of the compressor should have their elements renewed as recommended by the manufacturer, or more frequently if contaminated air is noted.

The drain valve on the air reservoir should be operated momentarily at intervals, when the compressor is running, to prevent the accumulation of moisture.

5.7 CYLINDER AIR SYSTEMS An alternative method of supplying air to divers is from a bank of compressed air cylinders, and the following requirements apply:

(a) Cylinders for compressed air breathing shall comply with AS 2030.1 and relevant supplements.

(b) The cylinder pressure shall be reduced by a suitable device capable of adjusting each diver's air line pressure appropriately, ensuring that adequate air is supplied to the diver under all conditions of air demand and depth, e.g. hard work, extended hose lengths at shallow depths.

(c) Each bank of cylinders shall be connected through the control system in such a manner that each can be isolated from the other while allowing the secondary bank to deliver air to the diver.

SECTION 6 PROCEDURES FOR SCUBA DIVING OPERATION

6.1 GENERAL (Restricted use of SCUBA) Due to its inherent limitations (as outlined in 3.1.3) open circuit Self Contained Breathing Apparatus (SCUBA) is not considered appropriate for the vast majority of diving tasks associated with tuna farming. While permitted, the use of SCUBA is restricted to a maximum depth of 20 metres. Diving operations using SCUBA should comply with the requirements of this section in addition to the general and medical requirements contained in other sections of this Code.

Diving operations using SCUBA shall only be carried out where X

(a) any tools or equipment used by a diver using SCUBA are of such type, size and dimension as can be manually handled and controlled by the diver;

(b) the diving operation does not require the use of cranes, plant or surface controlled equipment;

(c) prolonged physical exertion is not required of the diver;

NOTE: The task at hand should be considered carefully. Even jobs such as undoing bolts which appear simple at first can require more physical exertion than the diver should be required to expend if it is found that a bolt has seized.

(d) direct access to the surface can be maintained at all times and there is no significant risk of entanglement;

(e) sufficient breathing air is available in the cylinder to permit the diver's projected bottom time plus a 25% safety margin;

(f) the dive does not involve decompression stoppages;

(g) the maximum depth of the dive does not exceed 20 m; and

(h) air from a diver's SCUBA supply is not to be used for any purpose other than support of the diver, i.e. as a breathing medium or for limited buoyancy control.

NOTES:

1 Consideration should also be given to the need for visibility which will allow attending divers to achieve visual contact in an emergency.

2. For the purpose of requirement (d) it should be recognised that there is a significant risk of entrapment created when working near loose net.

6.2 PERSONNEL REQUIRED At every SCUBA diving operation there shall be sufficient personnel to ensure that diving is performed safely. The following minimum number of persons should be present for dive depths to 20 m: one supervisor, one diver, one diver's attendant, and one standby diver. (A minimum dive team of three persons).

The dive shall be controlled by a dive supervisor. Where more than one diver is in the water at any one time, one of the divers shall be nominated as the lead diver to coordinate the dive team while under water and to ensure that directions given by the supervisor are followed.

Where the safety of the divers is reliant on the buddy system, such divers should:

(a) be in visible contact;

(b) have direct access to each other so that they may render assistance to each other as required; and

(c) be attached to each other via a buddy line, unless this would result in an unacceptable increase in the risk of entanglement.

Note:

1. Where buddy lines are dispensed with, consideration should be given to the need to treat both divers as if they were operating independently, in which case each should have an independent lifeline or float line and be covered by a standby diver on the surface (see 6.4)

2 Where two or more divers are in the water at the same time a standby diver may not be necessary for each diver. The number of standby divers should be chosen after consideration of the dive profiles for each diver, their proximity to each other, the tasks at hand, the water conditions and their ability to assist each other.

3 It could be that the number of personnel listed above may be inadequate for a particular diving operation, in which case the person in charge should take extra precautions.

4 Utilizing the buddy diving system, it is permissible for both the diver and standby diver to be in the water at the same time. In such a situation, consideration should be given to the need for an extra person in the team to assist with diver recovery on the surface.

5 See also Clause 1.4.

6.3 EQUIPMENT

6.3.1 Components For SCUBA diving, the underwater equipment shall include the following:

(a) Either X

(i) a half-face mask with a separate mouthpiece incorporating a quick release safety strap capable of holding the mouthpiece securely in the mouth, together with means to hold the half-face mask securely in position on the head; or

(ii) a full-face mask or lightweight mask or helmet incorporating an oral/nasal inner mask or mouthpiece, together with means to hold the full-face mask, lightweight mask, or helmet securely in position on the head.

(b) A cylinder or cylinders of compressed air which includes an appropriate reserve air supply system.

(c) A cylinder valve for controlling the discharge of air from each cylinder.

(d) A cylinder regulator which can be used to regulate the pressure/volume of air from each cylinder.

(e) A demand air supply device, incorporating a mouthpiece.

(f) A body harness to secure the equipment to the diver.

(g) Fins and knife.

(h) An inflatable life vest (optional when using a hand-held lifeline).

(i) A submersible depth gauge.

6.3.2 Requirements for component parts

6.3.2.1 *Cylinder valves* Cylinder valves shall be operated by a hand control distinguishable by touch from any other handwheel of the apparatus.

It shall not be possible to completely unscrew the spindle from the valve body. The valve assembly should be designed to prevent foreign particles from entering the circuit from the cylinder.

6.3.2.2 *Manually operated reserve air supply* Any manually operated reserve air supply shall be designed to prevent accidental discharge. The control for reserve air supply shall be placed in position for convenient hand operation by the wearer under water at all times.

6.3.2.3 *Warning device* A warning device shall be fitted which shall be capable of warning the wearer when the air in a cylinder has been reduced to not less than 20% of its described working pressure.

When more than one cylinder is incorporated in the apparatus, the method of equalizing pressure (decanting) may be used as a warning device provided that both cylinder valves can be readily operated by the wearer under water at all times.

NOTE: A pressure gauge may act as a warning device if it is visible to the diver.

6.3.2.4 *Cylinder contents gauge* A gauge shall be provided to check the cylinder pressure immediately prior to using the diving equipment. The gauge shall be designed to withstand a pressure of 1.5 times the maximum filling pressure of the cylinder. The gauge shall be designed so that in the event of rupture of the gauge mechanism, the pressure will be relieved in a manner that will not endanger the user.

Where fitted as an integral part of the apparatus, the gauge shall incorporate a throttling or bleeding device which shall limit the flow of air through the pressure hose to the gauge, to prevent a sudden build-up of pressure or the excessive loss of air in the event of failure of the pressure hose or of the gauge.

6.4 LIFELINES Where a diver is operating independently, a lifeline complying with Clause 3.10(a) shall be used.

All divers using SCUBA shall use a lifeline complying with Clause 3.10(a) or a float line consisting of a line between the diver and a highly visible float on the surface. The following items also apply to the use of lifelines or float lines.

(a) Where more than one diver is in the water, lifelines or float lines may be used.

(b) Where divers are operating in pairs, then a single lifeline or float line to the surface may be used provided that both divers are secured to each other by a line, i.e. a buddy line. Where such a system is used, no diver shall detach himself from the buddy line unless both divers are on the surface.

(c) Where in an emergency, a standby diver using SCUBA is to assist a diver using SSBA, a means of securing the standby diver to the divers hose by means of a short line and running clip may be used in place of a second lifeline. Such a system shall only be used where the divers umbilical provides a direct and unrestricted route from the surface to the diver. Where the standby diver is required to perform anything other than emergency duties an independent lifeline must be provided.

(d) Where float lines are used X

(i) a safety boat of size and manoeuvrability which does not offer a hazard to the diver shall be used to tend the diver, if the diving is from a boat;

NOTE: The boat's propeller should be guarded.

(ii) sufficient personnel shall be available to monitor all float lines; and

(iii) divers operating on float lines shall wear inflatable life vests.

(e) Divers operating on hand-held lifelines may wear an inflatable life vest if desired.

(f) Where a lifeline or float line is used by a diver using SCUBA, the line shall be independently attached in such a manner that the weights and other equipment can be readily discarded by the diver under water without fouling the lifeline or float line.

SECTION 7 ACCIDENT REPORTING

7.1 ACCIDENT REPORT In all cases in which a diver has received a serious or fatal injury while engaged in or as a result of a diving operation, the supervisor shall prepare a report of the circumstances in which the diver sustained the injury or death. In all cases, action shall be immediately initiated to ensure that the regulatory authority is notified as soon as practicable after the occurrence of the accident.

NOTES:

1 Attention is drawn to AS 1885.1.

2 Attention is also drawn to Division 6.6 of the Occupational Health, Safety and Welfare Regulations 1995.

7.2 COMPOSITION OF THE REPORT The report shall contain the following:

(a) A summary of all aspects of the incident occasioning the injury or death, specifying X

  (i) the name and address of the injured diver;

  (ii) the date, location and time of the incident;

  (iii) details of the diving experience of the injured diver;

  (iv) the cause of the incident;

  (v) the supervisor's recommendations to prevent a recurrence; and

  (vi) the nature of the injury sustained by the diver.

(b) Full narrative statements from all persons (including the supervisor and, if practicable, the diver and diver's attendant) who were engaged in the relevant diving operation and who can detail any relevant information pertinent to the occurrence of the incident.

(c) Such medical reports, in relation to the diver, as are available, being reports compiled both before and after the occurrence of the incident.

(d) Full details of the type of diving apparatus used by the diver, in particular noting the condition of such equipment immediately after the incident including, in the appropriate case X

  (i) whether cylinder valves were opened or closed, and to what extent;

  (ii) remaining pressures in cylinder; and

  (iii) the position of the emergency supply valve.

7.3 DISPOSITION OF EQUIPMENT In any case in which component malfunction was likely or was suspected to have been a likely cause of a serious accident, then this equipment shall be immediately sealed and conveyed to an appropriate laboratory for testing and report.

In any case where a fatality has occurred, all equipment shall be left in the condition that it was in at the time of the accident until it has been investigated by the relevant authorities.

NOTE: Notwithstanding the above, the air supply of the equipment noted should be isolated to retain the remaining air. During such isolation the number of turns, any undue force or other actions, required to isolate the air supply should be noted and recorded.

7.4 BREATHING MEDIUM In any case where an accident may be related to the use of the breathing medium, a sample of the injured diver's breathing medium shall be taken and forwarded for appropriate laboratory analysis.

7.5 DISPOSITION OF REPORTS The supervisor shall forward one copy of the report to the local regional office of the Department for Administrative and Information Services.

APPENDIX A

MEDICAL STANDARDS FOR WORKERS IN UNDERWATER BREATHING OPERATIONS

(Normative)

A1 INTRODUCTION These medical standards are directed to the examination of occupational divers and those intending to undertake training for occupational diving.

NOTE: Medical standards designed for recreational SCUBA divers are contained in AS 4005.1.

The medical examination shall be conducted by a medical practitioner with appropriate training and experience in underwater medicine. At the time of publication of this Code, training provided by the basic and advanced course conducted by the Royal Australian Navy School of Underwater Medicine, the two week course conducted by the Royal Adelaide Hospital Hyperbaric Medicine Unit, or equivalent were considered the minimum appropriate training.

Diving is a physically taxing activity often conducted at remote locations. Candidates must therefore be physically and mentally robust. Since diving involves work under increased pressure and in a non-respirable environment specific medical standards are required.

The medical examination shall be carried out before a diver first uses compressed gas under water and subsequently at intervals not exceeding 12 months.

The record of examination shall be retained by the medical practitioner. A certificate of fitness, unfitness or temporary unfitness pending further examination shall be entered in the diver's logbook.

The diver's logbook and the diver's employer should hold a record of date, certification of fitness to dive, and the name and address of the doctor who performed that examination.

The examining medical practitioner should be satisfied as to the identity of the diver presenting for examination.

A2 DIVING RESTRICTIONS Although medical examination will usually result in a finding of fitness or unfitness for all diving activities X

(a) the examining medical practitioner may, for reasons of age or other factors revealed by the medical examination, elect to impose limitations as to the duration and depth to which a diver may dive or the length of validity of the certificate of fitness to dive; and

(b) any such limitation must be clearly identified on the certificate of fitness to dive in the diver's logbook.

A3 FITNESS CRITERIA

A3.1 General The following bodily systems (Paragraphs A3.2 to A3.14) shall be evaluated from the diver's history and the medical examination. Where relevant, numerical values are given for certain medical fitness requirements.

The information and questions on the medical form in this Appendix should comprise the minimum content of any alternative form used for the medical examination. The form in this Appendix may be copied for use by medical practitioners.

A3.2 Age The minimum age for a diver is 18 years. There is no upper age limit for diving provided that all the medical standards can be met. Serious consideration must be given however to the need for divers over the age of 40 to have adequate reserves of pulmonary and cardiovascular fitness for use in an emergency.

A3.3 Obesity Obesity is a particular hazard to divers as it causes an increased risk of decompression sickness. Obesity may also imply a lack of physical fitness. In general, a value of less than 15% in excess of the recommended weight should be aimed at. It should be noted that many height/age tables do not allow for variations in body type and examining medical practitioners should take this into account.

A3.4 Skin Any acute or chronic skin disorder should be assessed for its potential to be adversely affected by friction from diving suits, prolonged immersion, or prolonged exposure to the high humidity and high or low temperature environments which are commonly associated with diving activities.

A3.5 Vision The following visual acuity standard should be the minimum acceptable:

Uncorrected distant:	R.$^{6}/_{36}$ L.$^{6}/_{36}$
	both eyes $^{6}/_{24}$
Uncorrected near:	R.J16(N24) L.J16(N24)
	Both eyes J15 (N18)

Corrected near vision must allow the diver to read gauges, timing devices and written material including decompression tables.

Visual fields should be normal on simple testing.

Fundi should be normal.

Colour vision should be tested at initial examination and candidates informed of any abnormalities which should also be detailed in the diver's logbook.

A3.6 Ear, nose and throat Both tympanic membranes must be intact and mobile. The Eustachian tubes must be patent.

Any evidence of chronic outer or middle ear discharge, chronic or recurrent sinusitis, catarrh or severe allergic conditions, or any history of middle ear surgery (including tympanoplasty), is an indication for specialist consultation before any decision is made.

Audiometry Annual audiometric examinations shall be carried out in accordance with the procedures for audiometry testing given in AS 1269. Frequencies tested shall include 500, 1000, 2000, 4000, 6000 and 8000 Hz. An abnormal audiogram should be noted in the diver's logbook.

A hearing loss in either ear of 35 dB or more at frequencies up to 3000 Hz and 50 dB or more at frequencies above 3000 Hz is an indication for referral of the candidate to a specialist for further opinion, unless such opinion has been previously obtained and no significant deterioration has occurred since previous examination.

Doubts about labyrinthine function are an indication for specialist examination.

A3.7 Dental Candidates should have a high degree of dental fitness and any abnormalities of dentition or malformation of the mandible, likely to impair the candidate's ability to retain an unmodified diving equipment mouthpiece securely and easily, should classify that candidate as being medically unfit to dive.

A3.8 Central nervous system A full examination of the central nervous system must show normal function, but localized minor abnormalities such as patches of anaesthesia are allowed provided that generalized nervous system disease can be excluded. Any such abnormality should be accurately documented for future reference. Reflexes should be elicited carefully and their strength and symmetry recorded to enable future comparison.

Any history of fits (apart from uncomplicated childhood febrile convulsions), intracranial surgery, unexplained blackouts, depressed skull fracture, or severe head injury shall be cause for rejection.

A history of head injury may be acceptable if all of the following conditions apply:

(a) There has been a complete recovery.

(b) At least one month has passed since the injury occurred.

(c) There were no focal localizing signs.

(d) There was no post-traumatic epilepsy.

(e) The examiner considers that there is no increased risk of epilepsy or tendency to cerebral oxygen toxicity convulsions.

Specialist neurological opinion, including an electroencephalogram (EEG), should be sought when appropriate.

A history of migraine involving focal neurological events as a prodrome or sequelae is a contraindication to diving. Diving may exacerbate migraine, and other migraine cases thus require individual consideration including specialist referral, if appropriate.

The sharpened Romberg score is widely used by Australian hyperbaric units in assessing for vestibular or cerebellar diving related disease, and should be tested for as a baseline. It is performed as follows:

(i) Candidate stands on a hard floor, barefoot, with feet heel to toe in a straight line, arms crossed on chest and eyes closed.

(ii) Ability to maintain balance is timed and recorded in seconds as objectively as possible, e.g. number of seconds stable, number of `falls' in 60 seconds.

Freedom from psychiatric disorders is also of importance. There should be no increased susceptibility to neuroticism, anxiety states, depression, claustrophobia or agoraphobia, psychoses, or any organic cerebral syndrome.

A3.9 Cardiovascular system There must be no evidence of heart disease and any arhythmias must be fully investigated. Only innocent flow murmurs not associated with valve pathology can be accepted, and echo cardiography and specialist opinion should be sought when necessary to exclude valvular abnormality or septal defect.

The resting blood pressure should not exceed 150/90 mmHg.

All candidates must be assessed for freedom from ischaemic heart disease and for adequate exercise capacity to cope with the occasional high demands of underwater work.

This assessment should include X

(a) evaluation of risk factors such as obesity, smoking history, family history, blood pressure and serum lipids;

(b) an exercise test to assess exercise capacity; and

(c) an exercise ECG for candidates over 35 years.

Wherever any index of increased cardiovascular risk or any doubt concerning a diver's fitness for exercise exists, a properly conducted maximum effort stress ECG conducted by an appropriate specialist facility should be considered.

A3.10 Respiratory system The respiratory system shall be examined as follows:

(a) Particular attention shall be paid to any condition that might cause retention and trapping of expanding gas in any part of the lungs during decompression.

(b) The following conditions should automatically disqualify the candidate:

(i) Any chronic lung disease, past or present.

(ii) Any history of spontaneous pneumothorax, perforating chest injuries or open chest surgery.

(iii) Any past or present evidence of obstructive airways disease, e.g. asthma, chronic bronchitis, allergic bronchospasm.

(iv) Any fibrotic lesion of the lung that may cause generalized or localized lack of compliance in lung tissue.

(v) Any chest X-ray signs of pulmonary adhesions, tenting effects, emphysematous change, cysts, blobs or bullae.

In cases of doubt, respiratory specialist opinion should be sought. Such opinion should include provocative testing if there is any doubt about the possibility of bronchial hyperreactivity.

(c) Chest X-ray A large plate posterior-anterior chest X-ray shall be performed at the initial examination. This X-ray should be repeated subsequently at intervals not exceeding five years.

(d) Pulmonary function tests These tests shall be conducted as follows:

(i) All divers shall have annual pulmonary function tests to establish forced expiratory volume at 1 s (FEV_1) and forced capacity (FVC), recording best of three measurements.

(ii) An FVC or FEV_1 of more than 20% below predicted values or FEV_1/FVC ratio of less than 75% may indicate increased risk of pulmonary barotrauma and necessitate a finding of unfitness, especially in the case of an initial examination.

If no other abnormality is present, a finding of fitness may be allowable if additional specialist pulmonary function tests and opinion do not find any fixed or intermittent outflow obstruction that might predispose to pulmonary barotrauma.

A3.11 Gastro-intestinal tract Any abdominal herniation should be a cause for rejection until satisfactory treatment has taken place.

Divers should be free from significant acute or chronic gastro-intestinal problems which might cause acute crisis or incapacity in a remote location, e.g. peptic ulceration. Specialist opinion should be sought to assist in assessing any such risk if required.

A3.12 Musculo-skeletal Any impairment of musculo-skeletal function should be carefully assessed against the likely impairment of the diver's ability to carry out safely all tasks and responsibilities to which that diver is likely to be assigned. In particular, there should be no predisposition to back injury as diving tools and equipment can be of considerable weight when out of the water.

A3.13 Screening for dysbaric osteonecrosis (long bone X-rays and radioisotope scans)

A3.13.1 *Indications* These investigations are no longer recommended as a routine procedure for all divers. The incidence of dysbaric osteonecrosis has been shown to be low following properly conducted diving activities, and the incidence of potentially disabling juxta-articular lesions represents only a small proportion of cases detected. It should be noted that screening has sometimes been demanded for legal and liability for compensation reasons rather than for potential health benefit, and X-ray screening involves a significant radiation exposure.

Dysbaric osteonecrosis remains a significant health problem in certain populations of divers. However, this is particularly restricted to where diving activities have not been well controlled. The advisability of screening divers undertaking very deep or long dives, or those frequently undertaking multiple ascents should therefore be individually assessed.

A3.13.2 *Screening procedures (if indicated*) The radioisotope bone scanning procedure offers a sensitive screening modality for dysbaric osteonecrosis. X-rays may be required for diagnostic purposes and are the appropriate imaging modality to establish normal anatomy for future comparison should a baseline study be sought before exposure to diving. The early demonstration of dysbaric osteonecrosis and accurate estimation of its pathological extent requires high quality radiographs which clearly demonstrate bone trabeculae. Specific procedures have been developed and these are outlined in Paragraph A4. These specifications should be followed to ensure comparability of films and to ensure suitable diagnostic quality. It is of considerable advantage to have the surveys done in as few radiography centres as possible so that the medical imaging

technicians become closely involved in this work and are fully aware of the problems in interpretation and the need for high quality radiographs.

A3.14 Other criteria The following general criteria shall be fulfilled:

(a) A dipstick test of urine shall be performed. Glycosuria calls for investigation before acceptance. Albuminuria may be innocent, but acceptance should be considered after 24 h protein excretion studies and subsequent investigation if indicated.

(b) Diabetes requiring medication is a contraindication to diving.

(c) Sickle cell disease is a contraindication to diving and should be formally tested for in individuals of susceptible racial groups at initial examination.

(d) Divers taking medication of any type, including non-prescription drugs, require individual consideration. Many medications have altered effects or risks under water, or may increase decompression sickness risk, or the effects of nitrogen narcosis.

In particular most cardiac or central nervous system drugs are contraindicated.

(e) Cigarette smoking has deleterious cardiac, pulmonary and upper respiratory tract effects and should be strongly discouraged in divers.

(f) The effects of alcohol are highly dangerous under water, and dehydration following alcohol intake is a risk factor for decompression sickness.

(g) Psychological stability is important in avoiding accidents and coping with emergencies. Highly anxious, panic prone, phobic or unwilling candidates are at particular risk and frank psychiatric disease should be excluded.

(h) As diving operations may involve close contact, e.g. during a rescue situation or in decompression chambers, the candidates should be free of contagious diseases.

(i) Pregnancy is a contraindication for diving.

A4 SKELETAL SURVEY

NOTE: See Paragraph A3.13.

A4.1 General This skeletal survey is based on that previously recommended by The United Kingdom's Medical Research Council Decompression Sickness Registry.

The basic survey includes the following:

(a) Anterior-posterior (AP) radiograph of each shoulder joint.

(b) AP radiograph of each shoulder joint with arm in internal rotation.

(c) AP radiograph of each hip joint.

(d) AP radiograph of each knee joint.

(e) Lateral radiograph of each knee joint.

Possible additional projections are a radiograph of each hip joint with the leg in the lateral position.

Clear demonstration of bone trabeculae is essential and this will require the optimum screen/film combination, an adequate ratio grid and focal spot size of 1 mm to 2 mm. A small size with a high-speed rotating tube should be used if this is available. Gonad protection should always be used. A list of recommended projections and specimen radiographs illustrating these views should be available for the radiographer. Where possible, the radiographs should be checked before the patient leaves the X-ray room or department, preferably this should be done by the radiologist responsible for the interpretation.

A4.2 Shoulder joints The objective is to obtain a radiograph of the entire particular cortex of numeral head in unobscured profile. An 18 cm H 24 cm film is recommended. An AP projection of each shoulder is taken with the patient lying supine and the trunk rotated to bring the scapula on the side to be radiographed flat against the table top. With the arm in the supine position (palm up), pulled down and abducted 10E, the beam is centred 25 mm below the tip of the coracoid process of the scapula. The beam should be collimated by bringing in the diaphragms to show only the head and the proximal third of the shaft of the humerus. This view should show a clear joint space. The patient should hold his breath while the film is being exposed.

A4.3 Shoulder joints with arms in internal rotation An 18 cm H 24 cm film is recommended. An AP projection of each shoulder joint is taken with the patient placed in a supine position and the trunk rotated to bring the scapula on the side to be radiographed flat against the table top. The numeral head is then internally rotated by turning the forearm to the prone position (palm down), with the elbow slightly flexed and the humerus abducted approximately 10E. The beam is centred about 25 mm below the tip of the coracoid process of the scapula. The beam should be collimated by bringing in the diaphragms to show only the head and the proximal third of the shaft of the humerus. The patient should hold his breath while the film is being exposed.

A4.4 Hip joints The objective is to obtain a radiograph demonstrating the head of the femur. To obtain comparable radiographs at serial follow-up, the femoral neck should be in a standard position. A 24 cm H 30 cm film is recommended. A separate AP projection of each hip joint is taken with the patient placed in a supine position and the foot on the side under investigation at 90E to the table top. The beam should be centred over the head of the femur, i.e. 25 mm below the mid-point of the line joining the anterior-superior iliac spine and the mid-point of the upper border of the pubic symphysis. The beam should be collimated by bringing in the diaphragms to show only the head, neck and immediate subtrochanteric area of the femoral shaft. The edge of the gonad protector should be as near to the femoral head as possible but not obscuring it.

A4.5 Knee joints The objective is to ensure a comparable density between the lower two-thirds of the femur and the upper third of the tibia. It is recommended that the voltage be lowered, the current raised and use made of a grid. Two projections are used. A 30 cm H 40 cm film is recommended for both. An AP projection of each knee is made with the knee extended to include the lower two-thirds of the femur and the upper third of the tibia and fibula. The beam should be centred at the lower of the upper border of the patella.

A lateral projection of each knee joint is made with the patient rotated so that the lateral border of the knee to be examined is against the table. The opposite leg should be positioned so that a line through both anterior-superior iliac spines is at right angles to the table top. In this way, the projection of the knee joint is more likely to be a true lateral. The field should include the lower two-thirds of the femur and the upper third of the tibia and fibula. The beam should be centred at the level of the upper border of the patella.

A4.6 Hip joints with leg in lateral position (if required for diagnostic purposes) A 24 cm H 40 cm film is recommended. A lateral projection of the hip joint increases the potential radiation dose to the gonads. However, it may be of value in identifying an early lesion, particularly when there is a structural failure with a translucent subcortical band. A separate lateral projection of each joint is taken with the patient supine. The knee and hip on the side to be examined are flexed so that the foot is flat on the table top directly opposite the other knee. The thigh is then abducted maximally and the knee supported by a sandbag. The beam is centred over the head of the femur, i.e. 25 mm below the mid-point of the line joining the anterior-superior iliac spine and the upper border of the pubic symphysis. The projection should include the head, neck and immediate subtrochanteric region of the femur.

A4.7 Further comments The gonads must always be protected from ionizing radiation by a lead shield. If this is done, estimation of the radiation dose received by the patient indicates that the basic skeletal survey can be safely repeated at intervals of 12 months.

It is debatable whether the routine surveys should include the additional projections. However, when doing this type of work, it is not always practicable or easy to recall a patient for a repeat or extended radiographic examination. In this situation it is worthwhile to include the additional projections as they may help to indicate more clearly whether abnormality is present. When the recall is easy, the survey should be confined to the basic views.

Probably the greatest fault lies in under-penetration of the radiographs. Because of this, trabecular detail is not clearly seen and consequently small dense areas close to the joint surface will not be identified. During the process of repair, granulation tissue grows from the living bone into the neurotic bone and new bone is laid on the trabeculae causing an overall increase in bone bulk. Therefore, there is more tissue for the X-rays to penetrate and, unless the voltage is increased possibly as much as 10 kV, a pale, under-penetrated radiograph will result. When this happens, small dense areas will not be identified and this is one of the commonest causes of misinterpretation and failure to identify osteonecrosis. Other difficulties in interpretation arise from malrotation of the shoulder joint resulting in the superior border of the greater tuberosity appearing as a dense layer which could be misinterpreted as osteonecrosis. Further faults will arise from inadequate projection, exposure or other factors which affect the quality of radiographs.

Tomography may be required to improve definition, particularly in the femoral head and sometimes in the numeral head where detail is obscured by overlying bone. In general, however, good quality radiographs preclude the need for frequent use of tomography.

A1.1.MH (MEDICAL HISTORY) TO BE FILLED IN BY CANDIDATE. MEDICAL FORMX2299

1. SURNAME OTHER NAMES			2. DATE OF BIRTH
3. ADDRESS PHONE			4. Single Married 5. Sex X Male Female
6.NEXT OF KIN ADDRESS			
7.PRINCIPAL OCCUPATION			
8.HAVE YOU ANY DISEASE OR DISABILITY AT PRESENT? NO YES NAME OF CONDITION:			
.ARE YOU TAKING ANY TABLETS, MEDICINES OR OTHER DRUGS? NO YES TYPE OF DRUG:			
10.DO YOU SMOKE? NO YES No. PER DAY HAVE YOU SMOKED IN THE PAST? NO YES			
11.HOW MANY ALCOHOLIC DRINKS WOULD YOU CONSUME IN AN AVERAGE WEEK?			
HAVE YOU EVER SUFFERED, OR DO YOU NOW SUFFER FROM ANY OF THE FOLLOWING:			
	NO	YES	NOTES ON HISTORY (Doctor's use only)
12. ANY REACTIONS TO DRUGS OR MEDICINE?			
13. ANY OTHER ALLERGIES?			
14. ANY SKIN DISEASE?			
EYES 15. DO YOU WEAR GLASSES OR CONTACT LENSES?			
16. OTHER EYE OR VISUAL PROBLEMS?			
E.N.T 17. HAY FEVER?			
18. SINUSITIS?			
19. ANY OTHER NOSE OR THROAT PROBLEM?			
20. DENTURES/PLATES, DENTAL PROSTHESES?			
21. DENTAL PROCEDURES (WITHIN LAST MONTH)?			
22. DEAFNESS OR RINGING NOISES IN EAR(S)?			
23. DISCHARGING EARS OR OTHER INFECTIONS?			
24. OPERATION ON EARS?			
25. GIDDINESS OR LOSS OF BALANCE?			
26. MOTION SICKNESS?			
27. ANY DISABILITY/PAIN WHEN FLYING IN AIRCRAFT?			
28. DO YOU TAKE ANY SEASICKNESS MEDICINE?			
C.N.S 29. SEVERE HEADACHES OR MIGRAINE?			
30. FAINTING, BLACKOUTS, FITS OR EPILEPSY?			
31. UNCONSCIOUSNESS?			
32. CONCUSSION OR HEAD INJURY?			
33. SLEEPWALKING OR FREQUENT NIGHTMARES?			
34. SEVERE DEPRESSION?			
35. CLAUSTROPHOBIA?			
36. ANY OTHER MENTAL ILLNESS?			

MEDICAL HISTORY (continued)

	NO	YES	NOTES ON HISTORY

CIRCULATORY 37. ANY HEART DISEASE?			(Doctor's use only)
38. HIGH BLOOD PRESSURE?			
39. RHEUMATIC FEVER?			
40. EPISODE/S OF SWOLLEN OR PAINFUL JOINTS?			
RESPIRATORY 41. ABNORMAL SHORTNESS OF BREATH?			
42. BRONCHITIS OR PNEUMONIA?			
43. PLEURISY OR SEVERE CHEST PAINS?			
44. COUGHING UP BLOOD?			
45. T.B. (CONSUMPTION)?			
46. CHRONIC OR PERSISTENT COUGH?			
47. PNEUMOTHORAX (COLLAPSED LUNG)?			
48. ASTHMA OR WHEEZING?			
49. ANY OTHER CHEST COMPLAINT OR INJURY?			
50. ANY OPERATION ON CHEST, LUNG OR HEART?			
51. HAVE YOU EVER LIVED WITH A PERSON WITH T.B.?			
52. DOES ANYONE IN YOUR FAMILY SUFFER ASTHMA?			
G.I.T. 53. INDIGESTION OR PEPTIC ULCER?			
54. VOMITING BLOOD OR RECTAL BLEEDING?			
55. RECURRENT VOMITING OR DIARRHOEA?			
56. JAUNDICE OR HEPATITIS?			
57. MALARIA OR OTHER TROPICAL DISEASE?			
58. HAEMORRHOIDS (PILES)?			
59. SEVERE LOSS OF WEIGHT?			
60. HERNIA OR RUPTURE?			
M.S.K. 61. ANY MAJOR JOINT OR BACK INJURY?			
62. ANY FRACTURES (BROKEN BONES)?			
63. ANY PARALYSIS OR MUSCLE WEAKNESS?			
OTHER 64. KIDNEY OR BLADDER DISEASE?			
65. VENEREAL DISEASE?			
66. DIABETES?			
67. ANY BLOOD DISEASE OR BLEEDING PROBLEM?			
68. ANY CONTAGIOUS DISEASE?			
FEMALES ONLY 69. ARE YOU PREGNANT?			
70. HAVE YOU ANY INCAPACITY DURING OR BEFORE PERIODS?			
71. DO YOU TAKE THE ORAL CONTRACEPTIVE PILL?			
GENERAL 72. HAVE YOU HAD ANY OPERATIONS?			
73. HAVE YOU BEEN IN HOSPITAL OR A MENTAL INSTITUTION FOR ANY REASON?			
74. HAVE YOU EVER BEEN REJECTED FOR INSURANCE?			
75. HAVE YOU EVER BEEN REJECTED FOR A JOB?			
76. HAVE YOU EVER BEEN REJECTED FOR A LICENCE ON MEDICAL GROUNDS?			
77. HAVE YOU BEEN UNABLE TO WORK FOR MEDICAL REASONS?			
78. HAVE YOU EVER BEEN ON A PENSION?			
79. ANY OTHER ILLNESS OR INJURY?			

MEDICAL HISTORY (continued)

	NO	YES	NOTES ON HISTORY (Doctor's use only)
HAVE ANY OF YOUR FAMILY OR PEOPLE LIVING WITH YOU X 80. HAD T.B.?			
81. ATTEMPTED SUICIDE?			
82. HAD A NERVOUS OR MENTAL ILLNESS?			
83. HAD FITS OR EPILEPSY?			

A1.2 DMH (DIVING MEDICAL HISTORY) TO BE COMPLETED BY CANDIDATE.

	NOTES ON HISTORY
1. APPROX DATE OF FIRST SNORKEL DIVE	
2. APPROX DATE OF FIRST COMPRESSED AIR (SCUBA) DIVE	
3. APPROX NUMBER OF COMPRESSED AIR DIVES SINCE	
4. GREATEST DEPTH OF ANY DIVE	
5. LONGEST DURATION OF ANY DIVE	
6. APPROX DATE OF FIRST DIVE ON MIXED GASES (PRO DIVERS ONLY)	
7. APPROX NUMBER OF DIVES ON MIXED GASES (PRO DIVERS ONLY)	

	NO	YES	NOTES ON HISTORY (Doctor's use only)
HAVE YOU EVER SUFFERED FROM ANY OF THE FOLLOWING RELATED TO SWIMMING/BREATH HOLD OR COMPRESSED AIR DIVING? 8. SEVERE PAIN IN THE EARS OR FACE			
9. GIDDINESS OR DIZZINESS			
10. SHORTNESS OF BREATH			
11. SEVERE MARINE ANIMAL INJURY			
12. DEAFNESS			
13. CHEST PAIN			
14. RUPTURE OF AN EAR DRUM			
15. NEAR DROWNING			
COMPRESSED AIR DIVERS ONLY 16. NITROGEN NARCOSIS			
17. DECOMPRESSION SICKNESS			
18. BONE NECROSIS			
19. BURST LUNG			
20. AIR EMBOLISM			
21. GAS TOXICITY			
22. ANY OTHER DIVING INCIDENTS			

I certify that the above information is true and complete to the best of my knowledge:

Signed: _____ Date: _____

A1.3.ME (MEDICAL EXAMINATION) TO BE COMPLETED BY MEDICAL PRACTITIONER

1. Physique Good Average Poor	2. Height cm	3. Weight kg	4. Colour Eyes Hair Skin	5. Chest expansion Exp Insp Diff cm cm cm
6. Vision R6/ Corr 6/ L6/ Corr 6/	7. Colour Perception	8. Near Vision	9. Urinalysis Albumen Glucose	10. Chest X-ray Date .... Place ... Result .
11. Skeletal (long bone) X-ray Date ..... Place ..... Result ..... (If required)		12. Respiratory function test Vital capacity .... After FEV_1 . ... broncho Percentage .... dilator		

13. Blood Pressure	14. Audiometry	Frequency Hz					
	Hearing level	500	1000	2000	4000	6000	8000
Pulse rate/min	dB (R)						
	dB (L)						

CLINICAL EXAMINATION	NORMAL	ABNORMAL	NOTES ON FINDINGS
15. HEAD, SCALP, FACE AND NECK			
16. NOSE, SEPTUM, AIRWAY			
17. SINUSES			
18. MOUTH, THROAT, TEETH, SPEECH			
19. EARS GENERAL			
20. TYMPANIC MEMBRANE			
21. EUSTACHIAN TUBE FUNCTION			
22. OPHTHALMOSCOPY			
23. PUPILLARY REFLEXES			
24. EYE MOVEMENTS			
25. VISUAL FIELDS			
26. CHEST, LUNG FIELDS			
27. CARDIAC AUSCULTATION			
28. PERIPHERAL VASCULAR SYSTEM			
29. ABDOMEN AND GI TRACT			
30. HERNIAL ORIFICES			
31. ENDOCRINE SYSTEM			
32. GENITO-URINARY			
33. LYMPHATIC SYSTEM			
34. SPINE			
35. UPPER LIMBS			
36. LOWER LIMBS			
37. POSTURE AND GAIT			
38. CRANIAL NERVES			
39. REFLEXES*			
40. SENSATION			
41. CEREBELLAR FUNCTIONS			
42. EMOTIONAL STABILITY, PHOBIA			
43. MENTAL CAPACITY			
44. EXERCISE CAPACITY			
45. ECG AT REST			
46. SHARPENED ROMBERG SCORE*			
47. ANY IDENTIFYING MARKS? DETAIL			

FIT TO DIVE
UNFIT TO DIVE
DECISION PENDING
REASONS
SIGNED _____ DATED

* Results should be descriptively detailed at right to assist future comparison.

MEDICAL EXAMINATION (continued).

NOTES ON OTHER ABNORMALITIES (continued) **OR OTHER CONSULTATIONS**

APPENDIX B

DECOMPRESSION TABLES FOR DIVING
(Normative)

B1 INTRODUCTION As specified in Clause 3.9, diving operations shall not be carried out unless there are used, in those operations, recognised decompression tables. Examples of tables currently acceptable to regulatory authorities and for the purpose of this Code are those in use by the Royal Australian Navy, Royal Navy, United States Navy (excluding repetitive dive procedures), and those developed by the Canadian Defence and Civil Institute of Environmental Medicine (DCIEM) and in use by the Canadian Forces. For the purpose of this Code the preferred tables are the latter, i.e. the DCIEM tables - copies of which are included in this Appendix.

Note: In the interest of safety the tables have not been reproduced in an abbreviated form (ie limited to 30 metres).

The following operations are not allowed under this Code:

(a) Diving beyond 30 m. (For dives beyond 30 m special safety precautions in addition to those specified in this Code must be taken.)

(b) Repetitive dives undertaken using any tables based upon residual nitrogen time calculations, e.g. United States Navy repetitive dive tables, except the DCIEM repetitive dive procedures which are considerably more conservative and therefore have been allowed under this Code. (See Paragraph B4.5).

(c) The use of oxygen in the water for normal dive decompression tables.

This Appendix includes procedures for X

(i) use of decompression tables in general (see Paragraph B2);

(ii) decompression in water (see Paragraph B3);

(iii) use of DCIEM air diving tables for X

  (A) standard air decompression (see Paragraph B4.3);

  (B) surface decompression using oxygen (see Paragraph B4.4);

  (C) repetitive diving (see Paragraph B4.5); and

(iv) missed decompression stops (omitted decompression) (see Paragraph B5).

B2 USE OF TABLES X GENERAL

B2.1 Tables Although Paragraph B1 provides for alternative approved tables to be used in diving operations, this Code lists examples of tables in use by the Canadian Forces (DCIEM tables).

Whichever tables are to be used for diving, all instructions and procedures related to the use of such tables must be followed. It should be noted that diving in accordance with accepted tables does not eliminate all risk of decompression sickness and conservative diving practices are recommended wherever possible.

B2.2 Units Because of the critical nature of the instructions listed in these tables and the most serious consequences of any misinterpretation, approximate equivalents in imperial units have been shown in parentheses, following the prescribed SI units. It is important to note that while the depths in the text of this appendix are given in metres (m) followed by the equivalent depths in feet (ft) in parentheses this equivalent imperial units are approximations only and are not interchangeable as far as the decompression requirements in the tables are concerned. Example tables appear in metric form only.

B2.3 Hard work and cold water When a diver exerts himself under pressure, the body absorbs more gas than usual and a longer period of decompression to eliminate this gas will be required.

On all occasions, therefore, when hard physical work is carried out by a diver or when the dive is being carried out in cold water, the decompression routine for the dive should follow the schedule for the next longer time increment for the dive, or the next greater depth listed in the tables being used, or both of these precautions.

Although the DCIEM tables in this Code were, unlike most other tables, designed for hard work in cold water, the above precautions can also add additional safety to these tables.

B2.4 Use of 100% oxygen in decompression tables Surface decompression using oxygen in a compression chamber can avoid the risks associated with long in-water decompressions. However, all prescribed procedures must be followed accurately, and the possibility of an acute oxygen toxicity reaction allowed for. Surface decompression with oxygen is preferred to surface decompression using air breathing only. Administration of 100% oxygen in the water shall not be permitted.

Administration of 100% oxygen at the surface is a valuable first aid procedure for a diving casualty pending recompression, and it may also be used as a precaution whenever some factor in the dive causes concern that the risk of decompression sickness may have been increased.

Note that if signs or symptoms of decompression sickness are present, treatment should not be delayed (see Appendix C). For omitted decompression, the appropriate routine prescribed in the tables being used should be followed.

B2.5 Diving below the limiting line The limiting line divides each depth segment of the table into the `normal air diving' range above the line and `exceptional exposure' segment below the line. Such `exceptional exposure' dives shall only be intentionally carried out when it is determined that special circumstances justify the risk.

No further diving shall be undertaken for 24 h following an `exceptional exposure' dive.

The diver should remain within the vicinity of a compression chamber for 4 h following the dive. (See Paragraph B2.6.)

Under the DCIEM decompression procedures, surface decompression with oxygen is the preferred method of carrying out `exceptional exposure' dives.

B2.6 Procedure after diving in excess of 30 m A diver who has carried out a dive deeper than 30 m for a period above the limiting line in Table B1 shall remain within 4 h travelling time of a compression chamber for 12 h after completing the dive.

A diver who has carried out a dive of 30 m or more for a period below the limiting time in Table B1 shall remain in the immediate vicinity of a compression chamber, i.e. on site, for a period of 4 h after completing the dive, and within 4 h travelling time of a chamber for a further 12 h.

B2.7 Diving at altitude Most diving takes place at sea level where the pressure on the surface is 1 atm absolute.

If a dive is carried out at altitude, e.g. in a mountain lake, the surface pressure is less than 1 atm absolute. Because of this decompression schedules shall be adjusted according to the procedures prescribed in the tables in use.

NOTE:

It is envisaged that all diving covered by this Code will be performed at sea level. For this reason the information on diving at altitude, i.e. depth corrections, table and worksheet are not included in this Code.

However this information can be found in AS2299 and should be used if for any reason diving at altitude takes place (e.g. during training).

B3 DECOMPRESSION IN WATER X GENERAL The following items are relevant when carrying out decompression in water:

(a) The diver shall always be on a shot rope or lazy shot. To carry out decompression safely, the diver's maximum depth of dive and the depth at any moment during stops shall be known and recorded accurately on the dive record.

(b) Stops shall not be carried out swimming free, even when a depth gauge is carried.

(c) If a diver breaks surface before carrying out his full stops, the requirements of Paragraph B5 of Appendix B shall apply.

(d) The maximum depth of dive may be obtained by soundings, bearing in mind that if the diver is covering a wide area one sounding will not necessarily indicate the maximum depth of dive.

(e) The attended diver's depth while ascending a shot rope, as indicated by the markings on the lifeline or shot rope, will be accurate only when the shot rope is vertical in the water. If the shot is laid out from a boat swinging with wind or tide, the shot rope may be out at an angle from the boat; in this case the shot may be lifted off the bottom to hang as a lazy shot, or a separate lazy shot may be used.

B4 DCIEM AIR DIVING TABLES

B4.1 *Introduction* These tables and procedures have been developed from the Canadian Defence and Civil Institute for Environmental Medicine's 1983 decompression model. This model is the result of over 20 years of decompression research, and the tables have been extensively tested. They were chosen for inclusion in this Code as they are generally more conservative than previous commonly used tables, especially in the deeper depth or longer bottom time profiles.

Tables for standard air, surface decompression with oxygen and repetitive diving are included.

Although this Code covers diving only to a depth of 30 m, schedules for depth up to 72 m are included.

B4.2 Application of DCIEM tables X General The DCIEM tables are applied as follows:

(a) *Depth (Column 1 of Tables B1 and B2)* This column has depth increments of 3 m (10 ft), and the value to be used is the one immediately exceeding the deepest depth to which the diver descended in the dive. Thus stoppages for 30 m (100 ft) would be used for a dive to 28 m (94 ft). If there was any doubt about the accuracy of the depth of 28 m (94 ft), stoppages for 33 m (110 ft) would be used.

(b) *Bottom time (Column 2 of Tables B1 and B2)* The bottom time of the dive is the interval, in minutes, between the diver leaving the surface at the start of the dive and leaving the bottom to commence the ascent. The value to be used is the one

immediately exceeding the actual bottom time. Thus a dive to 30 m (100 ft) for 23 min would employ stoppages against a bottom time of 25 min. If there is any doubt about the accuracy of this time interval, stoppages against a bottom time of 30 min would be used.

(c) *Stoppages (Column 3 of Tables B1 and B2)* Stoppages are given opposite each depth increment for different bottom times. The time for each first stop commences when the diver leaves the bottom and the time for each subsequent stop commences when the diver leaves the preceding stop. In other words, the ascent time shall be included in the stoppage time throughout.

(d) *Rate of ascent* The rate of ascent shall not exceed 18 m/min (60 ft/min) to the first stop or between stops.

(e) *Rate of descent* The rate of descent shall not exceed 18 m/min (60 ft/min).

(f) *Surface interval (SurD)* When using Table B2 (DCIEM Air Diving Table 3 X SurD O_2), this is the time from when a diver leaves the 9 m (30 ft) water stop (or the bottom if no stop is required) till he arrives at the 12 m (40 ft) chamber stop. This shall not exceed 7 min.

(g *Repetitive dive* Any dive conducted within 18 h of a previous dive or any dive that has a repetitive factor greater than 1.0.

(h) *Repetitive dive groups (RG)* The repetitive dive group letter is directly related to the amount of residual nitrogen in a diver's body immediately on surfacing from a dive. The repetitive dive groups shown in Column 5 are different from and incompatible with repetitive dive groups in other tables, e.g. U.S. Navy. Where bottom times appear without repetitive groups, repetitive diving is not recommended.

(i) *Repetitive factor (RF)* X a figure determined by the repetitive dive group and the length of the surface interval after a dive and used for repetitive diving.

(j) *Effective bottom time (EBT)* X for repetitive diving, the bottom time is calculated to take into consideration the residual nitrogen from previous dives.

B4.3 Table B1 X Standard air decompression table (decompression in the water) Procedures for use of Table B1 follow:

(a) Selecting a schedule A schedule is selected based on the depth of the dive and the dive duration as follows:

Example Dive depth 32 m (104 ft), bottom time 22 min. Table B1 calls for schedule 33 m (110 ft)/25 min which is as follows:

(i) 6 m (20 ft) stoppage of 6 min (includes ascent time to this stop).

(ii) 3 m (10 ft) stoppage of 10 min.

(iii) Repetitive dive group on surfacing is G.

(b) Rates of ascent and descent and variations of rates The following procedures are used for calculating ascent time and correcting for fast or slow ascent rates:

(i) Ascent time Ascent time to a stop is included in that stop time. Therefore the time spent at a stop equals tabulated stop time minus travel time to that stop at 18 m (60 ft)/min.

Example Dive 42 m (140 ft)/15 min X standard air decompression. First stop from Table B1 is 6 min at 6 m (20 ft). Travel time to first stop at 18 m (60 ft)/min is 2 min. Therefore, actual time at 6 m (20 ft) stop is 4 min.

(ii) Ascent rate too slow and ascent delays (Less than 15 m (50 ft)/min). When this occurs, the following procedures are applicable:

(A) Delay starts deeper than half maximum depth of dive.

The delay is added to the bottom time of the dive and decompression is in accordance with the new bottom time.

(B) Delay starts shallower than half maximum depth of dive.

The delay is added to the stop time of the next stop. If no stop is scheduled, then a stop is added at 3 m (10 ft) for the time of the delay.

(C) After a delay has occurred, the timing of the ascent time (and therefore time at the next stop) should be restarted from the depth of the delay.

(iii) Ascent rate to first stop too fast No correction required (time at stop includes travel time to the stop).

(iv) Ascent rate too fast (No stops required). Observe diver for at least 1 h.

TABLE B1
STANDARD AIR DECOMPRESSION TABLE (DECOMPRESSION IN THE WATER)
(DCIEM/CANADIAN FORCES TABLE 1)

1	2	3										4	5
Depth not exceeding	**Bottom time leaving surface to beginning of ascent not exceeding**	**Stoppages at different depths, min**										**Total time for decompression**	**Repetitive group**
m	**min**	**30 m**	**27 m**	**24 m**	**21 m**	**18 m**	**15 m**	**12 m**	**9 m**	**6 m**	**3 m**	**min**	
9	30	X	X	X	X	X	X	X	X	X	X	X	A
	60	X	X	X	X	X	X	X	X	X	X	X	C
	90	X	X	X	X	X	X	X	X	X	X	X	D
	120	X	X	X	X	X	X	X	X	X	X	X	F
	150	X	X	X	X	X	X	X	X	X	X	X	G
	180 limiting line	X	X	X	X	X	X	X	X	X	X	X	H
	400	X	X	X	X	X	X	X	X	X	X	X	
	405	X	X	X	X	X	X	X	X	X	5	5	
	420	X	X	X	X	X	X	X	X	X	10	10	
	450	X	X	X	X	X	X	X	X	X	15	15	
	480	X	X	X	X	X	X	X	X	X	20	20	
12	30	X	X	X	X	X	X	X	X	X	X	X	B
	60	X	X	X	X	X	X	X	X	X	X	X	D
	90	X	X	X	X	X	X	X	X	X	X	X	G
	120	X	X	X	X	X	X	X	X	X	X	X	H
	150	X	X	X	X	X	X	X	X	X	X	X	J
	175 limiting line	X	X	X	X	X	X	X	X	X	X	X	L
	190	X	X	X	X	X	X	X	X	X	5	5	
	200	X	X	X	X	X	X	X	X	X	10	10	
	210	X	X	X	X	X	X	X	X	X	15	15	
	220	X	X	X	X	X	X	X	X	X	19	19	
	240	X	X	X	X	X	X	X	X	X	26	26	
	270	X	X	X	X	X	X	X	X	X	35	35	
	300	X	X	X	X	X	X	X	X	X	44	44	
	330	X	X	X	X	X	X	X	X	X	53	53	
	360	X	X	X	X	X	X	X	X	X	62	62	
15	20	X	X	X	X	X	X	X	X	X	X	X	A
	30	X	X	X	X	X	X	X	X	X	X	X	C
	40	X	X	X	X	X	X	X	X	X	X	X	D
	50	X	X	X	X	X	X	X	X	X	X	X	E
	60	X	X	X	X	X	X	X	X	X	X	X	F
	75	X	X	X	X	X	X	X	X	X	X	X	G
	100	X	X	X	X	X	X	X	X	X	5	5	I
	120	X	X	X	X	X	X	X	X	X	10	10	K
	125	X	X	X	X	X	X	X	X	X	13	13	K
	130	X	X	X	X	X	X	X	X	X	16	16	L
	140 limiting line	X	X	X	X	X	X	X	X	X	21	21	M
	150	X	X	X	X	X	X	X	X	X	26	26	
	160	X	X	X	X	X	X	X	X	X	31	31	
	170	X	X	X	X	X	X	X	X	X	35	35	
	180	X	X	X	X	X	X	X	X	X	40	40	
	200	X	X	X	X	X	X	X	X	X	50	50	
	220	X	X	X	X	X	X	X	X	X	59	59	
	240	X	X	X	X	X	X	X	X	X	70	70	
	260	X	X	X	X	X	X	X	X	X	81	81	
	280	X	X	X	X	X	X	X	X	X	91	91	
18	10	X	X	X	X	X	X	X	X	X	X	X	A
	20	X	X	X	X	X	X	X	X	X	X	X	B
	30	X	X	X	X	X	X	X	X	X	X	X	D
	40	X	X	X	X	X	X	X	X	X	X	X	E
	50	X	X	X	X	X	X	X	X	X	X	X	F
	60	X	X	X	X	X	X	X	X	X	5	5	G
	80	X	X	X	X	X	X	X	X	X	10	10	I
	90	X	X	X	X	X	X	X	X	X	16	16	J
	100	X	X	X	X	X	X	X	X	X	24	24	K
	110	X	X	X	X	X	X	X	X	X	30	30	L
	120 limiting line	X	X	X	X	X	X	X	X	X	36	36	M
	130	X	X	X	X	X	X	X	X	2	40	42	
	140	X	X	X	X	X	X	X	X	2	46	48	
	150	X	X	X	X	X	X	X	X	3	52	55	
	160	X	X	X	X	X	X	X	X	3	59	62	
	170	X	X	X	X	X	X	X	X	4	65	69	
	180	X	X	X	X	X	X	X	X	4	73	77	
	190	X	X	X	X	X	X	X	X	5	80	85	
	200	X	X	X	X	X	X	X	X	7	87	94	
	210	X	X	X	X	X	X	X	X	13	91	104	
	220	X	X	X	X	X	X	X	X	17	97	114	
	230	X	X	X	X	X	X	X	X	21	103	124	
	240	X	X	X	X	X	X	X	X	24	109	133	

(continued)

TABLE B1 (continued)

1	2	3										4	5
Depth not exceeding	**Bottom time leaving surface to beginning of ascent not exceeding**	**Stoppages at different depths, min**										**Total time for decompression**	**Repetitive group**
m	**min**	**30 m**	**27 m**	**24 m**	**21 m**	**18 m**	**15 m**	**12 m**	**9 m**	**6 m**	**3 m**	**min**	
21	10	X	X	X	X	X	X	X	X	X	X	X	A
	20	X	X	X	X	X	X	X	X	X	X	X	C
	25	X	X	X	X	X	X	X	X	X	X	X	D
	30	X	X	X	X	X	X	X	X	X	X	X	D
	35	X	X	X	X	X	X	X	X	X	X	X	E
	40	X	X	X	X	X	X	X	X	X	5	5	F
	50	X	X	X	X	X	X	X	X	X	10	10	G
	60	X	X	X	X	X	X	X	X	X	12	12	H
	70	X	X	X	X	X	X	X	X	3	17	20	J
	80	X	X	X	X	X	X	X	X	4	25	29	K
	90	X	X	X	X	X	X	X	X	5	32	37	M
	100 limiting line	X	X	X	X	X	X	X	X	6	39	45	N
	110	X	X	X	X	X	X	X	X	7	46	53	
	120	X	X	X	X	X	X	X	X	7	54	61	
	130	X	X	X	X	X	X	X	X	8	62	70	
	140	X	X	X	X	X	X	X	X	9	71	80	
	150	X	X	X	X	X	X	X	X	15	77	92	
	160	X	X	X	X	X	X	X	X	20	85	105	
	170	X	X	X	X	X	X	X	X	25	93	118	
	180	X	X	X	X	X	X	X	X	29	101	130	
	190	X	X	X	X	X	X	X	X	34	109	143	
	200	X	X	X	X	X	X	X	X	38	117	155	
24	10	X	X	X	X	X	X	X	X	X	X	X	A
	15	X	X	X	X	X	X	X	X	X	X	X	C
	20	X	X	X	X	X	X	X	X	X	X	X	D
	25	X	X	X	X	X	X	X	X	X	X	X	E
	30	X	X	X	X	X	X	X	X	X	5	5	F
	40	X	X	X	X	X	X	X	X	X	11	11	G
	50	X	X	X	X	X	X	X	X	4	11	15	H
	55	X	X	X	X	X	X	X	X	5	15	20	I
	60	X	X	X	X	X	X	X	X	6	21	27	J
	65	X	X	X	X	X	X	X	X	7	25	32	J
	70	X	X	X	X	X	X	X	X	7	30	37	K
	75	X	X	X	X	X	X	X	X	8	34	42	L
	80 limiting line	X	X	X	X	X	X	X	X	9	37	46	M
	85	X	X	X	X	X	X	X	X	9	42	51	
	90	X	X	X	X	X	X	X	X	10	46	56	
	95	X	X	X	X	X	X	X	X	11	50	61	
	100	X	X	X	X	X	X	X	X	11	55	66	
	110	X	X	X	X	X	X	X	2	12	64	78	
	120	X	X	X	X	X	X	X	3	18	72	93	
	130	X	X	X	X	X	X	X	4	23	82	109	
	140	X	X	X	X	X	X	X	4	28	93	125	
	150	X	X	X	X	X	X	X	5	33	104	142	
	160	X	X	X	X	X	X	X	5	39	114	158	
27	10	X	X	X	X	X	X	X	X	X	X	X	A
	15	X	X	X	X	X	X	X	X	X	X	X	C
	20	X	X	X	X	X	X	X	X	X	X	X	D
	25	X	X	X	X	X	X	X	X	X	7	7	E
	30	X	X	X	X	X	X	X	X	2	9	11	F
	40	X	X	X	X	X	X	X	X	6	10	16	H
	45	X	X	X	X	X	X	X	X	7	14	21	I
	50	X	X	X	X	X	X	X	X	8	20	28	J
	55	X	X	X	X	X	X	X	X	9	26	35	K
	60 limiting line	X	X	X	X	X	X	X	2	8	31	41	L
	65	X	X	X	X	X	X	X	3	8	36	47	
	70	X	X	X	X	X	X	X	3	9	40	52	
	75	X	X	X	X	X	X	X	4	9	46	59	
	80	X	X	X	X	X	X	X	4	10	51	65	
	85	X	X	X	X	X	X	X	5	10	56	71	
	90	X	X	X	X	X	X	X	5	14	60	79	
	95	X	X	X	X	X	X	X	6	17	64	87	
	100	X	X	X	X	X	X	X	6	20	70	96	
	110	X	X	X	X	X	X	X	7	26	82	115	
	120	X	X	X	X	X	X	X	8	31	95	134	

(continued)

TABLE B1 (continued)

1	2	3										4	5
Depth not exceeding	**Bottom time leaving surface to beginning of ascent not exceeding**	**Stoppages at different depths, min**										**Total time for decompression**	**Repetitive group**
m	**min**	**30 m**	**27 m**	**24 m**	**21 m**	**18 m**	**15 m**	**12 m**	**9 m**	**6 m**	**3 m**	**min**	
30	5	X	X	X	X	X	X	X	X	X	X	X	
	10	X	X	X	X	X	X	X	X	X	X	X	
	15	X	X	X	X	X	X	X	X	X	X	X	
	20	X	X	X	X	X	X	X	X	X	8	8	
	25	X	X	X	X	X	X	X	X	3	9	12	
	30	X	X	X	X	X	X	X	X	5	10	15	
	35	X	X	X	X	X	X	X	X	7	11	18	
	40	X	X	X	X	X	X	X	X	9	16	25	
	45	X	X	X	X	X	X	X	3	8	23	34	
	50	X	X	X	X	X	X	X	4	8	29	41	
	55 limiting line	X	X	X	X	X	X	X	5	9	34	48	
	60	X	X	X	X	X	X	X	6	9	40	55	
	65	X	X	X	X	X	X	X	6	10	46	62	
	70	X	X	X	X	X	X	X	7	10	52	69	
	75	X	X	X	X	X	X	X	8	14	56	78	
	80	X	X	X	X	X	X	X	8	18	61	87	
	85	X	X	X	X	X	X	X	9	21	67	97	
	90	X	X	X	X	X	X	2	8	24	75	109	
	95	X	X	X	X	X	X	3	8	27	82	120	
	100	X	X	X	X	X	X	3	8	31	90	132	
	105	X	X	X	X	X	X	3	9	34	98	144	
	110	X	X	X	X	X	X	4	8	38	106	156	
33	5	X	X	X	X	X	X	X	X	X	X	X	A
	10	X	X	X	X	X	X	X	X	X	X	X	B
	12	X	X	X	X	X	X	X	X	X	X	X	C
	15	X	X	X	X	X	X	X	X	X	5	5	D
	20	X	X	X	X	X	X	X	X	3	9	12	F
	25	X	X	X	X	X	X	X	X	6	10	16	G
	30	X	X	X	X	X	X	X	X	9	10	19	H
	35	X	X	X	X	X	X	X	3	8	16	27	I
	40	X	X	X	X	X	X	X	5	8	24	37	J
	45	X	X	X	X	X	X	X	6	9	31	46	K
	50	X	X	X	X	X	X	X	7	9	38	54	M
	55 limiting line	X	X	X	X	X	X	X	8	10	44	62	N
	60	X	X	X	X	X	X	2	7	10	51	70	
	65	X	X	X	X	X	X	3	7	15	55	80	
	70	X	X	X	X	X	X	4	7	19	62	92	
	75	X	X	X	X	X	X	4	8	23	68	103	
	80	X	X	X	X	X	X	5	8	26	77	116	
	85	X	X	X	X	X	X	5	9	30	86	130	
	90	X	X	X	X	X	X	6	9	34	95	144	
	95	X	X	X	X	X	X	6	9	38	105	158	
	100	X	X	X	X	X	X	7	9	42	114	172	
	105	X	X	X	X	X	X	7	12	45	123	187	
	110	X	X	X	X	X	X	8	15	48	130	201	
36	5	X	X	X	X	X	X	X	X	X	X	X	A
	10	X	X	X	X	X	X	X	X	X	X	X	C
	15	X	X	X	X	X	X	X	X	X	10	10	D
	20	X	X	X	X	X	X	X	X	6	9	15	F
	25	X	X	X	X	X	X	X	X	9	10	19	G
	30	X	X	X	X	X	X	X	4	8	14	26	I
	35	X	X	X	X	X	X	X	6	8	24	38	J
	40	X	X	X	X	X	X	X	8	8	32	48	K
	45	X	X	X	X	X	X	3	6	10	38	57	M
	50 limiting line	X	X	X	X	X	X	4	7	10	46	67	N
	55	X	X	X	X	X	X	5	7	13	53	78	
	60	X	X	X	X	X	X	6	7	18	59	90	
	65	X	X	X	X	X	X	6	8	22	66	102	
	70	X	X	X	X	X	X	7	8	27	75	117	
	75	X	X	X	X	X	X	8	8	31	86	133	
	80	X	X	X	X	X	2	6	9	35	97	149	
	85	X	X	X	X	X	3	6	10	40	107	166	
	90	X	X	X	X	X	3	7	13	42	118	183	
	95	X	X	X	X	X	4	6	16	46	128	200	
	100	X	X	X	X	X	4	7	19	50	136	216	

(continued)

TABLE B1 (continued)

1	2	3										4	5
Depth not exceeding	**Bottom time leaving surface to beginning of ascent not exceeding**	**Stoppages at different depths, min**										**Total time for decompression**	**Repetitive group**
m	**min**	**30 m (100 ft)**	**27 m (90 ft)**	**24 m (80 ft)**	**21 m (70 ft)**	**18 m (60 ft)**	**15 m (50 ft)**	**12 m (40 ft)**	**9 m (30 ft)**	**6 m (20 ft)**	**3 m (10 ft)**	**min**	
39	5		X	X	X	X	X	X	X	X	X	X	A
	8	X	X	X	X	X	X	X	X	X	X	X	B
	10	X	X	X	X	X	X	X	X	X	5	5	C
	15	X	X	X	X	X	X	X	X	4	8	12	E
	20	X	X	X	X	X	X	X	X	8	10	18	G
	25	X	X	X	X	X	X	X	5	7	11	23	H
	30	X	X	X	X	X	X	X	7	8	22	37	J
	35	X	X	X	X	X	X	3	6	9	30	48	K
	40	X	X	X	X	X	X	4	7	9	39	59	M
	45	X	X	X	X	X	X	6	7	10	47	70	N
	limiting line	X											
	50	X	X	X	X	X	X	7	7	15	53	82	
	55	X	X	X	X	X	2	6	8	20	61	97	
	60	X	X	X	X	X	3	6	8	25	70	112	
	65	X	X	X	X	X	4	6	8	30	82	130	
	70	X	X	X	X	X	4	7	9	34	94	148	
	75	X	X	X	X	X	5	6	11	39	106	167	
	80	X	X	X	X	X	5	7	14	42	118	186	
	85	X	X	X	X	X	6	7	17	47	129	206	
	90	X	X	X	X	X	6	8	20	52	138	224	
42	7	X	X	X	X	X	X	X	X	X	X	X	B
	10	X	X	X	X	X	X	X	X	X	7	7	D
	15	X	X	X	X	X	X	X	X	6	9	15	F
	20	X	X	X	X	X	X	X	4	7	10	21	G
	25	X	X	X	X	X	X	X	7	8	17	32	I
	30	X	X	X	X	X	X	4	6	8	28	46	K
	35	X	X	X	X	X	X	5	7	9	37	58	L
	40	X	X	X	X	X	X	7	7	10	46	70	N
	45	X	X	X	X	X	3	5	8	16	53	85	O
	limiting line												
	50	X	X	X	X	X	4	6	8	21	62	101	
	55	X	X	X	X	X	5	6	8	27	73	119	
	60	X	X	X	X	X	6	6	9	32	86	139	
	65	X	X	X	X	X	6	7	10	37	99	159	
	70	X	X	X	X	X	7	7	14	40	114	182	
	75	X	X	X	X	3	5	7	18	45	126	204	
	80	X	X	X	X	3	6	7	21	51	137	225	
	85	X	X	X	X	4	5	8	25	57	146	245	
	90	X	X	X	X	4	6	8	28	65	152	263	
45	7	X	X	X	X	X	X	X	X	X	X	X	B
	10	X	X	X	X	X	X	X	X	X	9	9	D
	15	X	X	X	X	X	X	X	X	8	9	17	F
	20	X	X	X	X	X	X	X	6	7	11	24	H
	25	X	X	X	X	X	X	4	5	8	23	40	J
	30	X	X	X	X	X	X	6	6	9	34	55	K
	35	X	X	X	X	X	3	5	7	10	44	69	M
	40	X	X	X	X	X	4	6	7	15	52	84	O
	limiting line												
	45	X	X	X	X	X	5	6	8	21	61	101	
	50	X	X	X	X	X	6	7	8	27	73	121	
	55	X	X	X	X	3	5	6	9	33	88	144	
	60	X	X	X	X	3	5	7	12	38	103	168	
	65	X	X	X	X	4	5	8	16	42	119	194	
	70	X	X	X	X	5	5	8	20	48	132	218	
	75	X	X	X	X	5	6	8	24	55	142	240	
	80	X	X	X	X	6	6	8	28	63	150	261	
48	6	X	X	X	X	X	X	X	X	X	X	X	B
	10	X	X	X	X	X	X	X	X	X	11	11	D
	15	X	X	X	X	X	X	X	4	6	10	20	G
	20	X	X	X	X	X	X	X	8	8	14	30	H
	25	X	X	X	X	X	X	6	6	8	29	49	K
	30	X	X	X	X	X	3	5	7	9	40	64	M
	35	X	X	X	X	X	5	5	8	13	49	80	N
	limiting line												
	40	X	X	X	X	X	6	6	8	20	59	99	
	45	X	X	X	X	3	5	6	9	26	72	121	
	50	X	X	X	X	4	5	7	9	33	88	146	
	55	X	X	X	X	5	5	7	13	38	105	173	
	60	X	X	X	X	6	5	8	17	43	122	201	
	65	X	X	X	X	7	5	8	22	50	135	227	
	70	X	X	X	3	4	6	8	26	58	146	251	

(continued)

TABLE B1 (continued)

1	2	3										4	5
Depth not exceeding	**Bottom time leaving surface to beginning of ascent not exceeding**	**Stoppages at different depths, min**										**Total time for decompression**	
m	**min**	**30 m**	**27 m**	**24 m**	**21 m**	**18 m**	**15 m**	**12 m**	**9 m**	**6 m**	**3 m**	**min**	**Repetitive group**
51	6	X	X	X	X	X	X	X	X	X	X	X	B
	10	X	X	X	X	X	X	X	X	5	8	13	D
	15	X	X	X	X	X	X	X	5	7	10	22	G
	20	X	X	X	X	X	X	5	5	8	20	38	I
	25	X	X	X	X	X	3	5	6	9	33	56	K
	30	X	X	X	X	X	5	5	7	10	46	73	M
	35 limiting line	X	X	X	X	3	4	6	8	18	55	94	O
	40	X	X	X	X	4	5	6	8	26	68	117	
	45	X	X	X	X	5	5	7	9	32	85	143	
	50	X	X	X	X	6	6	7	13	37	105	174	
	55	X	X	X	3	4	6	7	18	44	122	204	
	60	X	X	X	4	4	6	8	23	51	137	233	
	65	X	X	X	5	4	6	9	27	61	148	260	
	70	X	X	X	5	5	6	12	30	72	155	285	
54	5	X	X	X	X	X	X	X	X	X	X	X	B
	10	X	X	X	X	X	X	X	X	6	9	15	E
	15	X	X	X	X	X	X	X	7	7	11	25	H
	20	X	X	X	X	X	X	6	6	8	25	45	J
	25	X	X	X	X	X	5	5	7	9	39	65	M
	30 limiting line	X	X	X	X	3	4	6	7	15	50	85	O
	35	X	X	X	X	5	4	6	8	23	62	108	
	40	X	X	X	X	6	5	7	9	30	80	137	
	45	X	X	X	4	4	5	7	13	36	101	170	
	50	X	X	X	4	5	5	8	18	42	121	203	
	55	X	X	X	5	5	6	8	23	51	137	235	
	60	X	X	X	6	5	6	9	28	61	149	264	
57	5	X	X	X	X	X	X	X	X	X	X	X	
	10	X	X	X	X	X	X	X	X	8	9	17	
	15	X	X	X	X	X	X	4	5	7	11	27	
	20	X	X	X	X	X	4	4	6	9	29	52	
	25	X	X	X	X	X	7	5	7	10	44	73	
	30	X	X	X	X	5	4	6	8	19	55	97	
	35	X	X	X	3	4	5	6	9	27	72	126	
	40	X	X	X	4	4	5	7	11	35	93	159	
	45	X	X	X	5	5	5	8	17	41	116	197	
	50	X	X	3	3	5	6	8	22	50	135	232	
	55	X	X	4	3	5	7	9	27	61	149	265	
60	5	X	X	X	X	X	X	X	X	X	X	X	
	10	X	X	X	X	X	X	X	X	10	9	19	
	15	X	X	X	X	X	X	5	6	8	16	35	
	20	X	X	X	X	X	5	5	6	10	33	59	
	25	X	X	X	X	5	4	5	7	14	48	83	
	30	X	X	X	3	4	4	6	9	23	62	111	
	35	X	X	X	5	4	5	6	10	32	84	146	
	40	X	X	X	6	4	6	7	15	38	109	185	
	45	X	X	4	3	5	6	8	21	47	131	225	
	50	X	X	5	4	4	7	9	27	58	147	261	
63	5	X	X	X	X	X	X	X	X	X	5	5	
	10	X	X	X	X	X	X	X	5	6	10	21	
	15	X	X	X	X	X	X	7	6	8	20	41	
	20	X	X	X	X	X	7	5	7	9	39	67	
	25	X	X	X	X	6	4	6	8	17	52	93	
	30	X	X	X	5	4	4	7	8	28	71	127	
	35	X	X	3	3	4	6	7	12	35	97	167	
	40	X	X	4	4	4	6	8	19	43	123	211	
	45	X	X	5	4	5	6	9	25	54	142	250	
	50	X	3	3	4	6	6	13	29	70	154	288	
66	5	X	X	X	X	X	X	X	X	X	7	7	
	10	X	X	X	X	X	X	X	7	6	10	23	
	15	X	X	X	X	X	4	5	5	9	24	47	
	20	X	X	X	X	5	4	5	7	10	43	74	
	25	X	X	X	4	4	4	6	8	21	58	105	
	30	X	X	3	3	4	5	7	9	32	81	144	
	35	X	X	5	3	4	6	7	16	39	110	190	
	40	X	3	3	4	4	7	8	23	49	135	236	
	45	X	4	3	4	5	7	11	28	65	151	278	

(continued)

TABLE B1 (continued)

1	2	3										4	5
Depth not exceeding	**Bottom time leaving surface to beginning of ascent not exceeding**	**Stoppages at different depths, min**										**Total time for decompression**	**Repetitive group**
m (ft)	**min**	**30 m (100 ft)**	**27 m (90 ft)**	**24 m (80 ft)**	**21 m (70 ft)**	**18 m (60 ft)**	**15 m (50 ft)**	**12 m (40 ft)**	**9 m (30 ft)**	**6 m (20 ft)**	**3 m (10 ft)**	**min**	
69	5	X	X	X	X	X	X	X	X	X	8	8	
	10	X	X	X	X	X	X	X	8	7	10	25	
	15	X	X	X	X	X	6	4	6	9	28	53	
	20	X	X	X	X	6	4	6	7	12	47	82	
	25	X	X	X	6	3	5	6	9	24	65	118	
	30	X	X	5	3	4	5	7	12	35	93	164	
	35	X	3	3	4	4	6	8	19	44	123	214	
	40	X	5	3	4	5	6	9	27	57	146	262	
72	5	X	X	X	X	X	X	X	X	X	9	9	
	10	X	X	X	X	X	X	4	5	7	11	27	
	15	X	X	X	X	X	7	5	6	9	32	59	
	20	X	X	X	4	4	4	5	8	16	50	91	
	25	X	X	4	3	4	5	6	9	28	73	132	
	30	X	X	6	3	5	5	8	15	37	106	185	
	35	X	5	3	4	4	6	9	23	49	135	238	
	40	3	3	3	4	6	6	13	28	67	153	286	

B4.4 Table B2 X Surface decompression using oxygen (SurD O_2) Procedures relevant to Table B2 are as follows:

(a) *Table B2 instructions* The diver carries out surface decompression using oxygen by the following procedure:

(i) Ascend normally (following the same procedures as for Table B1) to 9 m (30 ft) or to the surface (if no in-water stop is shown).

(ii) Remain at the 9 m (30 ft) stop for the stop time. (Remember that the stop time includes ascent to 9 m (30 ft) stop at 18 m (60 ft)/min.)

(iii) Ascend to the surface and recompress on O_2 to 12 m (40 ft) in the compression chamber; the surface interval (SurD), the time from leaving the 9 m (30 ft) water stop (or the bottom, if no in-water stop is required) to reaching the 12 m (40 ft) compression chamber stop X should not exceed 7 min.

It is of the utmost importance that the diver be recompressed as quickly as possible. THE TIME BETWEEN THE DIVER LEAVING THE 9 m STOP (OR THE BOTTOM IF NO STOP IS REQUIRED) AND BEING PRESSURIZED TO 12 m IN THE COMPRESSION CHAMBER SHOULD NOT EXCEED SEVEN (7) MINUTES.

If more than seven minutes elapses from the time the diver leaves the bottom to the time he reaches the first stop, the decompression stoppages for the next longer duration of dive shall be used. An added risk of decompression sickness should then be borne in mind.

If more than 10 minutes elapses from the time the diver leaves the bottom to reaching the first stop, then the diver shall be recompressed on Table B5 X see Paragraph B6.

(iv) Remain on O_2 at 12 m (40 ft) for the tabulated stop time with 5 min air breaks after every 30 min on O_2.

NOTE: The `*' following the $O_2$ stop times in the Tables represent the number of air breaks. The tabulated 12 m (40 ft) stop times are `O_2 time' only, while the total decompression time column includes the air breaks. If no `*' follows a tabulated 30 min $O_2$ time, no air break is taken prior to the ascent on $O_2$. If only one `*' follows a tabulated 60 min O_2 time, no second air break is taken prior to ascent on O_2.

(v Ascend to the surface on O_2 (1 min is shown in the Table as a guide only).

Example

Dive 36 m (120 ft)/80 min.

Table B2 calls for Schedule 36 m (120 ft)/80 min.

15 m (50 ft) X 2 min stop on air (includes travelling time to the stop).

12 m (40 ft) X 6 min stop on air, and

9 m (30 ft) X 9 min stop on air.

Surface interval (SurD) from 9 m (30 ft) in-water to 12 m (40 ft) in compression chamber is 7 min.

12 m (40 ft) chamber stop X 70 min + two 5 min air breaks = 80 min total.

This is an `exceptional exposure' dive, therefore, repetitive dives are not recommended.

(vi) Table B2 has been validated by manned experiments to the limits of the `exceptional exposure' range. SurD $O_2$ is the preferred method for all compressed air diving requiring significant amounts of decompression, and it is the only method recommended for `exceptional exposure' diving. Repetitive diving can be conducted using SurD O_2 and this has been successfully validated (see Table B3).

(b) *Oxygen problems in compression chamber* Procedures for various oxygen problems are as follows:

(i) Loss of O_2 X switch diver to Table B1 X standard air table (12 m (40 ft) stop). O_2 time is `good' time and is subtracted from 12 m (40 ft), 9 m (30 ft) 6 m (20 ft) or 3 m (10 ft) stop as appropriate.

Example Dive 36 m (120 ft)/75 min.

Situation X After 42 min on O_2 in chamber at 12 m (40 ft), O_2 is lost.

Reaction X Table B1 36 m (120 ft)/75 min calls for X

12 m (40 ft) X 8 min stop.

9 m (30 ft) X 8 min stop.

6 m (20 ft) X 31 min stop.

3 m (10 ft) X 86 min stop.

The 42 min spent on O_2 satisfies the 12 m (40 ft) stop, 9 m (30 ft) stop, and 26 min of the 6 m (20 ft) stop.

Therefore, ascend to 6 m (20 ft) and do remaining 5 min of decompression, then ascend to 3 m (10 ft) to complete the 86 min decompression.

(ii) Minor symptoms of O_2 toxicity, carry out the following actions:

(A) Take diver off O_2.

(B) After symptoms are gone, either X

(1) diver remains on air for additional 15 min and then resume O_2 from time of interruption; or

(2) switch diver to standard air table, Table B1 as in (b)(i) above, and complete decompression on air, and

(C) if O_2 breathing is resumed and O_2 symptoms recur, switch diver to standard air table, Table B1 as in Item (b)(i) above, and complete decompression on air.

Example Dive 36 m (120 ft)/75 min.

Situation X After 11 min on O_2 in the compression chamber, the diver develops an O_2 symptom.

Reaction X All divers off O_2. Wait until the diver has stabilized plus 15 min then resume O_2 treatment.

From Table B2, 36 m (120 ft)/75 min calls for 70 min on O_2 plus two 5 min air breaks. If the diver took 4 min to stabilize then the 12 m (40 ft) chamber stop would be 11 + 4 (stabilize) + 15 (wait) + 30 + 5 (air break) + 29 (remainder) = 94 min.

Therefore, complete the diver's decompression in accordance with this schedule and then bring him to the surface.

Notice that in this case air breaks are taken every 30 min when the treatment resumes.

(iii) Serious, incapacitating symptoms of CNS O_2 toxicity carry out the following actions:

(A) Take diver off O_2, STABILIZE.

NOTE: Compression chamber depth is not to be altered while the diver is convulsing.

(B) Switch to Table B1 as in Item (b)(i) above, and complete decompression on air.

TABLE B2
SURFACE DECOMPRESSION USING OXYGEN (DCIEM/CANADIAN FORCES TABLE 3)

1	2	3										4	5
Depth not exceeding	**Bottom time leaving surface to beginning of ascent not exceeding**	**Stoppages at different depths, min**									**Cham-ber on oxygen**	**Total time for decompression**	**Repetitive group**
		In-water stops on air											
m	**min**	**30 m**	**27 m**	**24 m**	**21 m**	**18 m**	**15 m**	**12 m**	**9 m**	**Surface interval**	**12 m**	**min**	
18	50	X	X	X	X	X	X	X	X	7	X	X	F
	70	X	X	X	X	X	X	X	X	maximum	10	18	H
	80	X	X	X	X	X	X	X	X		16	24	H
	90	X	X	X	X	X	X	X	X		20	28	I
	100	X	X	X	X	X	X	X	X		24	32	J
	110	X	X	X	X	X	X	X	X		28	36	K
	120 limiting line	X	X	X	X	X	X	X	X		30	38	K
	130	X	X	X	X	X	X	X	X		32*	45	
	140	X	X	X	X	X	X	X	X		38*	51	
	150	X	X	X	X	X	X	X	X		42*	55	
	160	X	X	X	X	X	X	X	X		46*	59	
	170	X	X	X	X	X	X	X	X		50*	65	
	180	X	X	X	X	X	X	X	X		54*	68	
	190	X	X	X	X	X	X	X	X		57*	70	
	200	X	X	X	X	X	X	X	X		60*	73	
	210	X	X	X	X	X	X	X	X		63**	81	
	220	X	X	X	X	X	X	X	X		69**	87	
	230	X	X	X	X	X	X	X	X		73**	92	
	240	X	X	X	X	X	X	X	X		77**	95	
21	35	X	X	X	X	X	X	X	X	7	X	X	E
	50	X	X	X	X	X	X	X	X	maximum	6	14	H
	60	X	X	X	X	X	X	X	X		15	23	H
	70	X	X	X	X	X	X	X	X		21	29	I
	80	X	X	X	X	X	X	X	X		26	34	J
	90	X	X	X	X	X	X	X	X		30	38	K
	100 limiting line	X	X	X	X	X	X	X	X		34*	47	K
	110	X	X	X	X	X	X	X	X		40*	53	
	120	X	X	X	X	X	X	X	-		45*	58	
	130	X	X	X	X	X	X	X	X		50*	63	
	140	X	X	X	X	X	X	X	X		55*	68	
	150	X	X	X	X	X	X	X	X		59*	72	
	160	X	X	X	X	X	X	X	X		63**	81	
	170	X	X	X	X	X	X	X	X		71**	89	
	180	X	X	X	X	X	X	X	X		76**	94	
	190	X	X	X	X	X	X	X	X		81**	99	
	200	X	X	X	X	X	X	X	X		85**	104	
24	25	X	X	X	X	X	X	X	X	7	X	X	E
	45	X	X	X	X	X	X	X	X	maximum	12	20	H
	50	X	X	X	X	X	X	X	X		17	25	H
	55	X	X	X	X	X	X	X	X		21	29	H
	60	X	X	X	X	X	X	X	X		24	32	I
	70	X	X	X	X	X	X	X	X		30	38	J
	80 limiting line	X	X	X	X	X	X	X	X		35*	48	K
	90	X	X	X	X	X	X	X	X		42*	55	
	100	X	X	X	X	X	X	X	2		47*	62	
	110	X	X	X	X	X	X	X	2		53*	68	
	120	X	X	X	X	X	X	X	3		58*	74	
	130	X	X	X	X	X	X	X	4		62**	84	
	140	X	X	X	X	X	X	X	4		72**	94	
	150	X	X	X	X	X	X	X	5		78**	101	
	160	X	X	X	X	X	X	X	5		84**	107	
27	20	X	X	X	X	X	X	X	X	7	X	X	D
	35	X	X	X	X	X	X	X	X	maximum	8	16	G
	40	X	X	X	X	X	X	X	X		16	24	G
	45	X	X	X	X	X	X	X	X		21	29	H
	50	X	X	X	X	X	X	X	X		25	33	H
	55	X	X	X	X	X	X	X	1		28	37	I
	60 limiting line	X	X	X	X	X	X	X	2		30*	45	J
	70	X	X	X	X	X	X	X	3		37*	53	
	80	X	X	X	X	X	X	X	4		45*	62	
	90	X	X	X	X	X	X	X	5		52*	70	
	100	X	X	X	X	X	X	X	6		58*	77	
	110	X	X	X	X	X	X	X	7		65**	90	
	120	X	X	X	X	X	X	X	8		74**	100	

NOTE: Asterisk (*) indicates number of 5 min air breaks required.

(continued)

TABLE B2 (continued)

1	2	3										4	5
Depth not exceeding	**Bottom time leaving surface to beginning of ascent not exceeding**	**Stoppages at different depths, min**										**Total time for decompression**	**Repetitive group**
		In-water stops on air								**Surface interval**	**Chamber on oxygen**		
m	**min**	**30 m**	**27 m**	**24 m**	**21 m**	**18 m**	**15 m**	**12 m**	**9 m**		**12 m**	**min**	
30	15	X	X	X	X	X	X	X	X	7	X	X	D
	30	X	X	X	X	X	X	X	X	maximum	8	16	G
	35	X	X	X	X	X	X	X	X		17	25	G
	40	X	X	X	X	X	X	X	2		22	32	H
	45	X	X	X	X	X	X	X	3		27	38	I
	50	X	X	X	X	X	X	X	4		30	42	I
	55 limiting line	X	X	X	X	X	X	X	5		31 *	49	J
	60	X	X	X	X	X	X	X	6		37 *	56	
	70	X	X	X	X	X	X	X	7		46 *	66	
	80	X	X	X	X	X	X	X	8		54 *	75	
	90	X	X	X	X	X	X	2	8		60 *	83	
	100	X	X	X	X	X	X	3	8		72 **	101	
	110	X	X	X	X	X	X	4	8		81 **	111	
33	12	X	X	X	X	X	X	X	X	7	X	X	C
	25	X	X	X	X	X	X	X	X	maximum	7	15	G
	30	X	X	X	X	X	X	X	2		16	28	G
	35	X	X	X	X	X	X	X	3		22	33	H
	40	X	X	X	X	X	X	X	5		27	40	I
	45	X	X	X	X	X	X	X	6		30 *	49	J
	50	X	X	X	X	X	X	X	7		35 *	55	K
	55 limiting line	X	X	X	X	X	X	X	8		40 *	61	K
	60	X	X	X	X	X	X	2	7		45 *	67	
	65	X	X	X	X	X	X	3	7		50 *	73	
	70	X	X	X	X	X	X	4	7		54 *	78	
	75	X	X	X	X	X	X	4	8		59 **	84	
	80	X	X	X	X	X	X	5	8		60 **	91	
	85	X	X	X	X	X	X	5	9		69 **	101	
	90	X	X	X	X	X	X	6	9		75 **	108	
	95	X	X	X	X	X	X	6	9		80 **	113	
	100	X	X	X	X	X	X	7	9		85 **	119	
	105	X	X	X	X	X	X	7	12		89 **	126	
	110	X	X	X	X	X	X	8	15		93 ***	139	
36	10	X	X	X	X	X	X	X	X	7	X	X	C
	20	X	X	X	X	X	X	X	X	maximum	7	15	F
	25	X	X	X	X	X	X	X	2		13	23	G
	30	X	X	X	X	X	X	X	4		21	33	G
	35	X	X	X	X	X	X	X	6		27	41	H
	40	X	X	X	X	X	X	X	8		30 *	51	I
	45	X	X	X	X	X	X	3	6		36 *	58	J
	50 limiting line	X	X	X	X	X	X	4	7		42 *	66	K
	55	X	X	X	X	X	X	5	7		48 *	73	
	60	X	X	X	X	X	X	6	7		53 *	79	
	65	X	X	X	X	X	X	6	8		58 *	85	
	70	X	X	X	X	X	X	7	8		60 **	93	
	75	X	X	X	X	X	X	8	8		70 **	104	
	80	X	X	X	X	X	2	6	9		76 **	111	
	85	X	X	X	X	X	3	6	10		82 **	119	
	90	X	X	X	X	X	3	7	13		87 **	128	
	95	X	X	X	X	X	4	6	16		90 **	134	
	100	X	X	X	X	X	4	7	19		100 ***	153	
39	8	X	X	X	X	X	X	X	X	7	X	X	B
	20	X	X	X	X	X	X	X	X	maximum	8	16	G
	25	X	X	X	X	X	X	X	5		18	31	G
	30	X	X	X	X	X	X	X	7		26	41	H
	35	X	X	X	X	X	X	3	6		30 *	52	I
	40	X	X	X	X	X	X	4	7		36 *	60	J
	45 limiting line	X	X	X	X	X	X	6	7		43 *	69	K
	50			X	X	X	X	7	7		49 *	76	
	55	X	X	X	X	X	2	6	8		54 *	83	
	60	X	X	X	X	X	3	6	8		60 *	90	
	65	X	X	X	X	X	4	6	8		67 **	103	
	70	X	X	X	X	X	4	7	9		75 **	113	
	75	X	X	X	X	X	5	6	11		81 **	121	
	80	X	X	X	X	X	5	7	14		87 **	131	
	85	X	X	X	X	X	6	7	17		90 ***	143	
	90	X	X	X	X	X	6	8	20		101 ***	158	

NOTE: Asterisk (*) indicates number of 5 min air breaks required.

(continued)

TABLE B2 (continued)

1	2	3										4	5
Depth not exceeding	**Bottom time leaving surface to beginning of ascent not exceeding**	**Stoppages at different depths, min**										**Total time for decompression**	**Repetitive group**
		In-water stops on air								**Surface interval**	**Chamber on oxygen**		
m	**min**	**30 m**	**27 m**	**24 m**	**21 m**	**18 m**	**15 m**	**12 m**	**9 m**		**12 m**	**min**	
42	7	X	X	X	X	X	X	X	X	7	X	X	B
	15	X	X	X	X	X	X	X	X	maximum	7	15	F
	20	X	X	X	X	X	X	X	4		12	24	G
	25	X	X	X	X	X	X	X	7		23	38	H
	30	X	X	X	X	X	X	4	6		30	48	I
	35	X	X	X	X	X	X	5	7		34 *	59	J
	40	X	X	X	X	X	X	7	7		42 *	69	K
	45 limiting line	X	X	X	X	X	3	5	8		49 *	78	M
	50	X	X	X	X	X	4	6	8		55 *	86	
	55	X	X	X	X	X	5	6	8		60 **	97	
	60	X	X	X	X	X	6	6	9		70 **	109	
	65	X	X	X	X	X	6	7	10		78 **	119	
	70	X	X	X	X	X	7	7	14		84 **	130	
	75	X	X	X	X	3	5	7	18		90 **	141	
	80	X	X	X	X	3	6	7	21		100 ***	160	
	85	X	X	X	X	4	5	8	25		107 ***	172	
	90	X	X	X	X	4	6	8	28		113 ***	182	
45	7	X	X	X	X	X	X	X	X	7	X	X	B
	15	X	X	X	X	X	X	X	X	maximum	8	16	G
	20	X	X	X	X	X	X	X	6		17	31	G
	25	X	X	X	X	X	X	4	5		27	44	H
	30	X	X	X	X	X	X	6	6		30 *	55	I
	35	X	X	X	X	X	3	5	7		40 *	68	K
	40 limiting line	X	X	X	X	X	4	6	7		48 *	78	M
	45	X	X	X	X	X	5	6	8		55 *	87	
	50	X	X	X	X	X	6	7	8		60 **	99	
	55	X	X	X	X	3	5	6	9		72 **	113	
	60	X	X	X	X	3	5	7	12		80 **	125	
	65	X	X	X	X	4	5	8	16		87 **	138	
	70	X	X	X	X	5	5	8	20		95 ***	156	
	75	X	X	X	X	5	6	8	24		105 ***	171	
	80	X	X	X	X	6	6	8	28		111 ***	182	
48	6	X	X	X	X	X	X	X	X	7	X	X	B
	15	X	X	X	X	X	X	X	4	maximum	7	19	G
	20	X	X	X	X	X	X	X	8		21	37	G
	25	X	X	X	X	X	X	6	6		30	50	I
	30	X	X	X	X	X	3	5	7		37 *	65	J
	35 limiting line	X	X	X	X	X	5	5	8		46 *	77	L
	40	X	X	X	X	X	6	6	8		54 *	87	
	45	X	X	X	X	3	5	6	9		60 *	96	
	50	X	X	X	X	4	5	7	9		72 **	115	
	55	X	X	X	X	5	5	7	13		81 **	129	
	60	X	X	X	X	6	5	8	17		88 **	142	
	65	X	X	X	X	7	5	8	22		99 ***	164	
	70	X	X	X	3	4	6	8	26		108 ***	178	
51	6	X	X	X	X	X	X	X	X	7	X	X	B
	10	X	X	X	X	X	X	X	X	maximum	6	14	D
	15	X	X	X	X	X	X	X	5		11	24	G
	20	X	X	X	X	X	X	5	5		25	43	H
	25	X	X	X	X	X	3	5	6		30 *	57	J
	30	X	X	X	X	X	5	5	7		42 *	72	K
	35 limiting line	X	X	X	X	3	4	6	8		51 *	85	M
	40	X	X	X	X	4	5	6	8		60 *	96	
	45	X	X	X	X	5	5	7	9		70 **	114	
	50	X	X	X	X	6	6	7	13		80 **	130	
	55	X	X	X	3	4	6	7	18		89 **	145	
	60	X	X	X	4	4	6	8	23		101 ***	169	
	65	X	X	X	5	4	6	9	27		110 ***	184	
	70	X	X	X	5	5	6	12	30		117 ***	198	

NOTE: Asterisk (*) indicates number of 5 min air breaks required.

(continued)

TABLE B2 (continued)

1	2	3										4	5
		Stoppages at different depths, min									Cham-ber on oxygen		
		In-water stops on air											
Depth not exceeding	Bottom time leaving surface to beginning of ascent not exceeding	30 m	27 m	24 m	21 m	18 m	15 m	12 m	9 m	Surface interval	12 m	Total time for decompression	Repetitive group
m	min											min	
54	5	X	X	X	X	X	X	X	X	7	X	X	B
	10	X	X	X	X	X	X	X	X	maximum	7	15	E
	15	X	X	X	X	X	X	X	7		15	30	G
	20	X	X	X	X	X	X	6	6		28	48	H
	25	X	X	X	X	X	5	5	7		36 *	66	J
	30 limiting line	X	X	X	X	3	4	6	7		47 *	80	M
	35	X	X	X	X	5	4	6	8		56 *	92	
	40	X	X	X	X	6	5	7	9		66 **	111	
	45	X	X	X	4	4	5	7	13		78 **	129	
	50	X	X	X	4	5	5	8	18		88 **	146	
	55	X	X	X	5	5	6	8	23		101 ***	171	
	60	X	X	X	6	5	6	9	28		110 ***	187	
57	5	X	X	X	X	X	X	X	X	7	X	X	
	10	X	X	X	X	X	X	X	X	maximum	8	16	
	15	X	X	X	X	X	X	4	5		19	36	
	20	X	X	X	X	X	4	4	6		30	54	
	25	X	X	X	X	X	7	5	7		41 *	73	
	30	X	X	X	X	5	4	6	8		52 *	88	
	35	X	X	X	3	4	5	6	9		60 *	100	
	40	X	X	X	4	4	5	7	11		75 **	124	
	45	X	X	X	5	5	5	8	17		85 **	143	
	50	X	X	3	3	5	6	8	22		99 ***	169	
	55	X	X	4	3	5	7	9	27		110 ***	188	
60	5	X	X	X	X	X	X	X	X	7	X	X	
	10	X	X	X	X	X	X	X	X	maximum	9	17	
	15	X	X	X	X	X	X	5	6		22	41	
	20	X	X	X	X	X	5	5	6		31 *	60	
	25	X	X	X	X	5	4	5	7		45 *	79	
	30	X	X	X	3	4	4	6	9		56 *	95	
	35	X	X	X	5	4	5	6	10		69 **	117	
	40	X	X	X	6	4	6	7	15		82 **	138	
	45	X	X	4	3	5	6	8	21		92 ***	162	
	50	X	X	5	4	4	7	9	27		108 ***	187	
63	10	X	X	X	X	X	X	X	5	7	7	20	
	15	X	X	X	X	X	X	7	6	maximum	25	46	
	20	X	X	X	X	X	7	5	7		36 *	68	
	25	X	X	X	X	6	4	6	8		49 *	86	
	30	X	X	X	5	4	4	7	8		60 *	101	
	35	X	X	3	3	4	6	7	12		76 **	129	
	40	X	X	4	4	4	6	8	19		88 **	151	
	45	X	X	5	4	5	6	9	25		105 ***	182	
	50	X	3	3	4	6	6	13	29		116 ***	203	
66	10	X	X	X	X	X	X	X	7	7	7	22	
	15	X	X	X	X	X	4	5	5	maximum	28	50	
	20	X	X	X	X	5	4	5	7		40 *	74	
	25	X	X	X	4	4	4	6	8		54 *	93	
	30	X	X	3	3	4	5	7	9		68 **	117	
	35	X	X	5	3	4	6	7	16		83 **	142	
	40	X	3	3	4	4	7	8	23		99 ***	174	
	45	X	4	3	4	5	7	11	28		112 ***	197	
69	10	X	X	X	X	X	X	X	8	7	11	27	
	15	X	X	X	X	X	6	4	6	maximum	30	54	
	20	X	X	X	X	6	4	6	7		44 *	80	
	25	X	X	X	6	3	5	6	9		58 *	100	
	30	X	X	5	3	4	5	7	12		75 **	129	
	35	X	3	3	4	4	6	8	19		89 **	154	
	40	X	5	3	4	5	6	9	27		107 ***	189	
72	10	X	X	X	X	X	X	4	5	7	14	31	
	15	X	X	X	X	X	7	5	6	maximum	30 *	61	
	20	X	X	X	4	4	4	5	8		48 *	86	
	25	X	X	4	3	4	5	6	9		60 **	109	
	30	X	X	6	3	5	5	8	15		80 **	140	
	35	X	5	3	4	4	6	9	23		98 ***	175	
	40	3	3	3	4	6	6	13	28		114 ***	203	

NOTE: Asterisk (*) indicates number of 5 min air breaks required.

B4.5 Table B3 X Repetitive diving Procedures relevant to Table B3 are as follows:

(a) Repetitive diving is permitted only in the normal air diving range and has been validated using the standard air and surface decompression using oxygen methods.

NOTES:

1 A repetitive diving flowchart is shown as Figure B1 to aid in using the repetitive dive procedures.

2 For surface intervals of less than 30 min, the `combined dive' procedure is used. The combined dive procedure can also be used as an alternative to the repetitive dive procedure outlined below. This will result in shorter bottom times or more decompression for any second or subsequent dive, and thus usually more conservative dives.

(b) The repetitive dive group letters (A-O) shown beside each dive profile in the normal air range of the DCIEM tables are used in conjunction with the repetitive factors table. These correction factors are based on the first dive and surface interval (to determine the `residual' nitrogen) in conjunction with any possible depth (within the normal air diving range) for the second dive.

There are two tables that apply in this area. Table B3(a) is used with the repetitive group and the surface interval to find the repetitive factor. Table B3(b) gives the maximum time limits (actual bottom time) allowed for a no-decompression (No-D) repetitive dive. (The no-decompression limits given in Table B1 are for first dives only.) An example of a repetitive dive worksheet is shown in Figure B2.

(c) To use Tables B3(a) and B3(b) X

(i) take the repetitive dive group (RG) letter of the first dive and enter the repetitive factor table (Table B3(a));

(ii) find the repetitive factor (RF) corresponding to that letter and the applicable surface interval column;

(iii) for repetitive dives requiring decompression multiply the actual bottom time of the second dive by the RF to obtain the effective bottom time (EBT). Decompress for the depth and EBT.

Example:

First dive is 36 m (120 ft) for 15 min; RG = D (Table B1).

SI = 40 min; RF = 1.5.

Second dive is 36 m (120 ft) for 10 min; EBT = 10 H 1.5 = 15 min.

Decompress for 36 m (120 ft) for 15 min EBT (RG = D); and

(iv) for no-decompression repetitive dives X

(A) from Table B3(b) find the allowable no-decompression limit, under the RF for the depth of the second dive (this is an actual bottom time and not an EBT);

(B) if a third or subsequent dive is planned, the RG can be taken from Table B3(b) for the allowable no-decompression limit time or by multiplying the actual bottom time of the last dive by the RF to obtain the EBT and then going back into the tables.

Example:

First dive X 18 m (60 ft) for 30 min. RG = D (Table B1).

The surface interval is 1 h, and the repetitive dive depth is 15 m (50 ft). From Table B3(a), the RF is 1.4 and from Table B3(b), the maximum allowable no-decompression limit time is 45 min (RG = G).

The actual bottom time planned is only 30 min and a third dive is intended later. Therefore, the EBT = 30 H 1.4 (RF after first dive) = 42 min, with an RG of E (Table B1).

SI before third dive X 1 h 15 min. RF = 1.5.

Third dive depth is 12 m (40 ft). From Table B3(b), the maximum allowable bottom time at 12 m (40 ft) is 115 min.

NOTE: For repetitive bottom times exceeding the allowable no-decompression limits in Table B3(b), a minimum 5 min decompression stop at 3 m (10 ft) is mandatory.

Example:

First dive is 18 m (60 ft) for 50 min; RG = F.

SI to next dive = 1 h 45 min.

Second dive planned is 18 m (60 ft) for 30 min; RF is 1.5.

EBT is 1.5 H 30 = 45 min which is in the no-decompression range of Table B1. However, from Table B3(b), only 26 min is allowed for RF = 1.5. Therefore, decompression required is 5 min at 3 m (10 ft).

Although only combinations using the same decompression method for each dive have been given as examples, there is no reason why different decompression methods cannot be used for each dive in a series. For example, a first `inspection' dive of 15 m (50 ft)/10 min decompressed on standard air (short decompression) could be followed by a 45 m (150 ft)/40 min `working' dive decompressed on oxygen at the surface (lengthy decompression).

(d) The repetitive factors have been cut off arbitrarily, at 2.0. It is felt that after a strenuous first dive, the surface interval should be sufficient in length to reduce the `residual' nitrogen level of the diver to that degree. (This, in effect, defined the limits of the printed tables.)

It should be noted that the repetitive dive group for a specific dive profile is not always the same in Tables B1 and B2. This is due to the fact that oxygen decompression is more efficient than decompression on air. Therefore, the repetitive groups in the oxygen tables will always be equal to or lower (never higher) than those in the air tables for the same dive.

NOTE: If a second dive is required before 30 min or before the surface interval reduces the repetitive factor to 2.0, add the two bottom times to obtain the effective bottom time and use the deeper depth of the two dives and the EBT for determining the decompression schedule (combined dive procedure).

Alternatively, if the repetitive dive is to a different depth, enter the tables for the depth of the repetitive dive. Using the RG from the first dive, read back to the bottom time noted for that group. Add that bottom time to the intended bottom time to obtain the EBT for the repetitive dive.

(e) When conducting a series of similar no-decompression dives (similar depth/bottom time/surface interval), it is possible to arrive at succeeding EBTs which result in the same repetitive group and repetitive dive factor. The result is that the table would list each succeeding dive in the no-decompression category. Eventually, however, decompression stops will be required for safety.

A series of 15 m (50 ft)/30 min dives with 30 min surface intervals is an example of this phenomenon.

If such a situation develops, remote as it may be, the repetitive no-decompression cycle must be interrupted by altering the dive profile and/or the surface interval, after the second dive.

TABLE B3(a)
REPETITIVE FACTORS (RF)
(DCIEM/CANADIAN FORCES AIR DIVING TABLE 4A)

Repetitive group (RG)	RF for surface intervals (SI) in h:min								
	0:30 -0:59	1:00 -1:29	1:30 -1:59	2:00 -2:59	3:00 -3:59	4:00 -5:59	6:00 -8:59	9:00 -11:59	12:00 -18:00
A	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0
B	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.0
C	1.4	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0
D	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.0
E	1.6	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.1
F	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.1
G	1.9	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1
H	X	1.9	1.7	1.6	1.5	1.4	1.3	1.1	1.1
I	X	2.0	1.8	1.7	1.5	1.4	1.3	1.1	1.1
J	X	X	1.9	1.8	1.6	1.5	1.3	1.2	1.1
K	X	X	2.0	1.9	1.7	1.5	1.3	1.2	1.1
L	X	X	X	2.0	1.7	1.6	1.4	1.2	1.1
M	X	X	X	X	1.8	1.6	1.4	1.2	1.1
N	X	X	X	X	1.9	1.7	1.4	1.2	1.1
O	X	X	X	X	2.0	1.7	1.4	1.2	1.1

TABLE B3(b)
ALLOWABLE NO-DECOMPRESSION LIMITS FOR REPETITIVE DIVES
(DCIEM/CANADIAN FORCES AIR DIVING TABLE 4B)

Depth m	Allowable No-D limit (min) for repetitive factors (RF)										Repet. group (RG)
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	
12	160	145	135	125	115	105	96	90	85	80	L
15	60	55	50	45	41	38	35	33	31	30	G
18	40	35	30	28	26	24	23	22	21	20	F
21	30	25	21	19	18	17	16	15	14	13	E
24	20	17	15	14	13	12	11	11	10	10	E
27	16	14	12	11	10	10	9	8	8	8	D
30	13	11	10	9	9	8	7	7	6	6	D
33	10	9	8	7	7	6	6	6	5	5	C
36	8	7	6	6	6	5	5	5	4	4	C
39	7	6	6	5	5	5	4	4	4	4	B
42	6	5	5	5	4	4	4	3	3	3	B
45	6	5	5	5	4	4	4	3	3	3	B

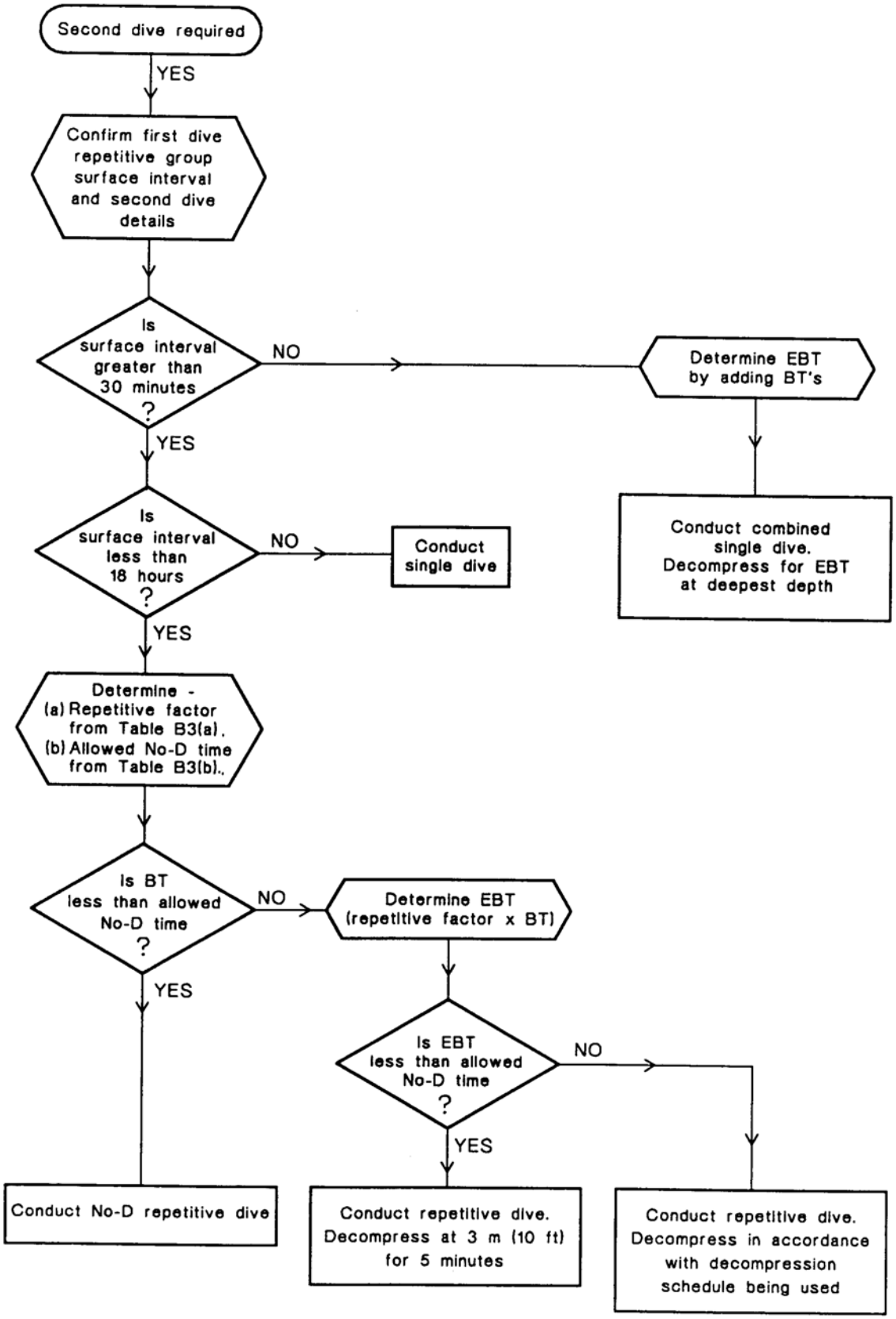


FIGURE B1 REPETITIVE DIVING FLOWCHART

REPETITIVE DIVING WORKSHEET

FIRST DIVE:

Depth _____/time _____ Table used _____

Repetitive group _____

SECOND DIVE:

SI _____hr _____min; RF (Table B3(a)) (a) _____

depth _____; Table to be used _____

Planned bottom time (b) min

EBT = (a) H (b) = (c) min

Allowable No-D limit (from Table B3(b)) _____ min

DIVE SCHEDULE: Depth _____/ (c) min

Decompression required: _____Yes _____No

Note: If (b) exceeds allowable No-D limits in Table B3(b), a minimum 5 min decompression stop at 3 m (10 ft) is mandatory

depth _____ min

depth _____ min _____

depth _____ min _____ O_2 stop (if required)

depth _____ min _____ depth _____ min _____

Repetitive group

FIGURE B2 EXAMPLE OF REPETITIVE DIVING WORKSHEET FOR DCIEM TABLES

B5 MISSED DECOMPRESSION STOPS (OMITTED DECOMPRESSION)

B5.1 General For whatever reason, if a diver surfaces from a dive requiring decompression stops having omitted or not completed the correct decompression procedure, action shall be taken quickly to prevent the onset of decompression illness.

An omitted decompression treatment flowchart is shown as Figure B4 to aid in choosing the appropriate treatment procedure.

B5.2 Action to be taken If a diver shows signs of decompression illness, immediate therapeutic treatment in accordance with Appendix C is essential.

If a diver has omitted decompression but remains asymptomatic, the omitted decompression procedure in B5.3 shall be followed.

B5.3 Omitted decompression (Diver shows no symptoms)

(a) Compression chamber immediately available (less than 7 min) X

(i) if a stop equivalent to the 9 m (30 ft) stop time from Table B1 was completed, switch to Table B2 X SurD O_2 and do tabulated compression chamber O_2 stop; or

(ii) if 9 m (30 ft) or deeper stops were not completed X treat using Table B5.

(b) Compression chamber not immediately available:

The preferred action is to get the diver to a compression chamber for treatment. The diver should receive 100% O_2 by double-seal oral/nasal face mask en route to the compression chamber. However, the supervisor has the following options if the situation warrants it:

(i) Return the diver to the next deeper stop where the omission occurred and repeat this stop. Continue decompression in accordance with the original schedule (Example 1).

(ii) If no deeper stop was called for, spend the time of the first stop at the next deeper stop and repeat the total schedule (Example 2).

Example 1: Dive 39 m (130 ft)/40 min.

Standard air table calls for X

12 m (40 ft) X 4 min stop,

9 m (30 ft) X 7 min stop,

6 m (20 ft) X 9 min stop, and

3 m (10 ft) X 39 min stop.

Situation: Diver surfaces after completing the 12 m (40 ft) stop, the 9 m (30 ft) stop and 3 min of the 6 m (20 ft) stop. Diver shows no symptoms, compression chamber not available.

Reaction: Immediately put diver back in the water to 9 m (30 ft) and resume schedule beginning with 7 min at this stop.

Example 2: Same dive.

Situation: On ascent to 12 m (40 ft) stop, diver loses control and surfaces (blow-up). Diver is OK (totally asymptomatic).

Reaction: Immediately put diver back in the water to 15 m (50 ft) for 4 min and then complete total schedule.

TABLE B5
TABLE FOR OMITTED DECOMPRESSION
(RN TABLE 61, USN TABLE 5)

1	2		3		4	5	6
Finishing time for each stage (surface - 00 00) h min	**Depth (seawater)**		**Pressure equivalent to depth**		**Breathing medium**	**Duration of stage**	
	m	**ft**	**kPa**	**psig**		**min**	**Comment**
00 00	0	0	surface	surface	oxygen	X	start descent
00 02	0 to 18	0 to 60	to 184	to 26.7	oxygen	2	descent completed
00 22	18	60	184	26.7	oxygen	20	
00 27	18	60	184	26.7	air	5	
00 47	18	60	184	26.7	oxygen	20	
01 17	18 to 9	60 to 30	184 to 92	26.7 to 13.4	oxygen	30	first ascent stage
01 22	9	30	92	13.4	air	5	
01 42	9	30	92	13.4	oxygen	20	
01 47	9	30	92	13.4	air	5	
02 17	9 to 0	30 to 0	to surface	to surface	oxygen	30	second ascent stage
X	0	0	surface	surface	air	X	

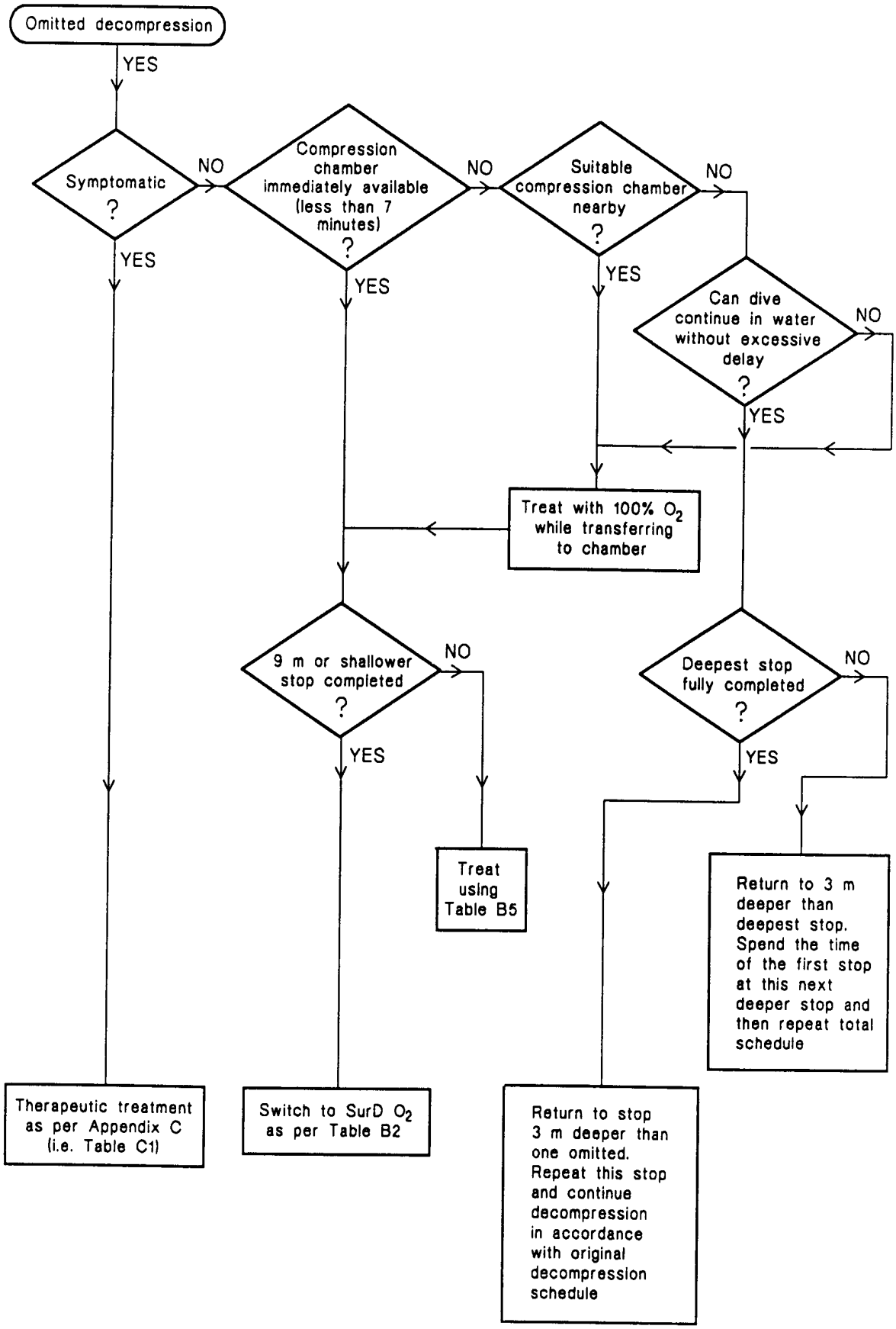


FIGURE B4 OMITTED DECOMPRESSION TREATMENT FLOWCHART

APPENDIX C

TREATMENT FOR DECOMPRESSION ILLNESS

(Normative)

C1 INTRODUCTION Therapeutic recompression shall be performed only by a person qualified in diving supervision, a medical practitioner experienced in diving medicine or, if neither of the above is available, a person trained or experienced in compression chamber operations.

The person supervising therapeutic recompression should seek advice from a medical practitioner experienced in this field. If such advice is not available locally, it should be sought from one of the agencies listed in Appendix L. Alternatively, assistance may be sought from the Diver Emergency Service on: 1800 088 200.

C2 DIAGNOSIS

C2.1 Decompression illness Decompression illness (DCI) is the term currently being recommended to describe all forms of decompression related problems regardless of the mechanism that has led to the condition. The term, therefore, includes the conditions known as `decompression sickness' and `cerebral arterial gas embolism'. This new terminology has arisen as a result of the difficulty encountered in trying to elucidate the mechanism of illness in many cases, the fact that mixed pictures often occur and current treatment recommendations do not differentiate between DCI arising from different mechanisms. The description `decompression illness' should be qualified by the part of the body affected, the severity and its timing, e.g. `severe spinal cord decompression illness' arising within a few minutes of surfacing.

The signs and symptoms listed below are subdivided into the categories of DCI previously usually referred to as this older terminology remains in current use.

C2.2 Decompression sickness Symptoms and signs of decompression sickness usually appear within a few hours of diving, but onset may be delayed for 36 hours or more.

Any body system or part may be affected to a degree from apparently minimal to severe and life threatening.

Untreated, the diver's condition may deteriorate with time, and additional new symptoms may develop.

Feeling generally unwell or unexpectedly lethargic are common early symptoms that may precede more specific symptoms.

Upon examination, many divers suffering decompression sickness will have signs of spinal cord, nerve or cerebral disease which may not have been reported initially. Careful neurological examination is therefore important in all cases. This examination may be conducted in the chamber, after treatment has commenced, if appropriate.

Some of the possible symptoms and signs of decompression sickness include skin rash, pain (anywhere), tingling sensations, numbness, weakness or paralysis, difficulty passing urine, visual disturbance, mental slowness, confusion, convulsions or unconsciousness, giddiness, loss of balance or co-ordination, headache, nausea, vomiting and breathing difficulty.

C2.3 Cerebral arterial gas embolism (CAGE) This usually presents within twenty minutes of a dive and commonly follows a rapid ascent. It can occur following ascents of as little as one metre, and significant bottom time is not required.

Any loss of consciousness or rapid onset of neurological or cardiac problems following a dive should be treated as CAGE. The sudden onset of any symptoms of cardiac problems should be similarly treated.

Although symptoms of pulmonary barotrauma are not necessary for the diagnosis of CAGE, all patients suffering pulmonary barotrauma shall be carefully examined to exclude any neurological problem that would indicate the complication of CAGE. Pulmonary barotrauma may be suggested by breathlessness, difficulty breathing, pain in the chest, cyanosis (blueness) or coughing of blood-stained sputum.

C3 FIRST AID

C3.1 100% Oxygen The rapid institution of 100% oxygen breathing pending recompression will often alleviate symptoms and improve the final outcome of treatment, although improvement on oxygen does not remove the necessity for recompression.

It is important to ensure that the gas breathed by the lungs contains as near as possible to 100% oxygen as can be delivered by the resuscitator specified in Clause 3.7.

A tight fitting oral/nasal face mask, or mouthpiece and nose clip supplied by demand valve or oxygen reservoir bag is necessary to prevent dilution of the oxygen by atmospheric air. Standard disposable medical oxygen masks or nasal catheters are unsuitable.

Oxygen therapy at atmospheric pressure can be conducted for many hours before pulmonary oxygen toxicity becomes a problem. The onset of central chest pain or other indications of this complication may require cessation of oxygen therapy pending medical assessment.

C3.2 Position Whenever serious DCI is suspected, the patient should be made comfortable, lying horizontally. If the patient is not fully conscious, the patient's airway should be protected, e.g. by lying the patient on the side (lateral or coma position).

The steep (30E) head down position that has sometimes been recommended is extremely uncomfortable and risks congestion and swelling of the brain and regurgitation of stomach contents. It should not be used for decompression illness routinely.

Some anecdotal case histories suggest that an initial period of head down position may, however, be beneficial in some serious cases of DCI due to arterial gas embolisation. In cases where major neurological or cardiac symptoms arise within 15 min of surfacing, a trial of head down position may be beneficial provided that is compatible with maintenance of the patient's airway, administration of 100% oxygen and cardio-pulmonary resuscitation (CPR) if necessary. The head should be lower than the heart which should be lower than the abdomen and pelvis. The legs should not be elevated any more than the rest of the body.

This position, if tried, should not be maintained if there is no response and, even if there is useful response, the patient should be returned gradually to a level position within 15 min.

Severe and even fatal relapses have occurred when CAGE patients have sat or stood up.

No patient possibly suffering from arterial gas embolism should therefore be allowed to sit or stand up before recompression unless they have been stable and walking around already.

C3.3 Basic life support This should be instituted along usual guidelines if required. If CPR is indicated, carrying it out in the head down position may be considered as it may aid in the redistribution of any gas embolism that might be causing the lack of effective circulation.

C3.4 Other therapy Administration of fluids is useful. Intravenous fluids are preferred, however oral fluids may be offered to the conscious patient without abdominal problems. Plain water is preferred, and alcoholic and caffeine containing fluids should be avoided.

Urinary catheterization will be necessary for patients who cannot pass urine, including patients with severe spinal or cerebral decompression illness and those who are unconscious.

Pneumothorax shall be treated by intercostal drainage before decompression can occur during therapeutic recompression therapy.

C4 RECOMPRESSION THERAPY Recompression is the definitive treatment for decompression illness. Modern therapy requires the use of oxygen in a suitable two-compartment chamber (see Section 4).

The initial treatment for all cases of decompression illness resulting from air diving operations should be with an approved therapeutic table such as Table C1. This is an oxygen treatment table which commences at 18 m equivalent chamber depth with the patient breathing 100% oxygen.

The advice of a medical practitioner experienced in underwater medicine and therapeutic recompression should always be sought, and should be considered mandatory in the following situations:

(a) Any case where symptoms do not rapidly and completely resolve.

(b) Any case which continues to deteriorate or relapses during treatment with Table C1.

(c) Where pressurization equivalent to greater than 18 m depth of seawater is considered.

(d) Where symptoms recur following initial treatment.

C5 OXYGEN TREATMENT TABLE

C5.1 General Table C1 is the initial treatment table for all cases of decompression illness resulting from air diving operations.

TABLE C1
INITIAL OXYGEN TREATMENT TABLE
(RN TABLE 62, USN TABLE 6)

1	2		3		4	5	6
Finishing time for each stage (surface = 00 00) h min	**Depth (seawater)**		**Pressure equivalent to depth**		**Breathing medium**	**Duration of stage**	
	m	**ft**	**kPa**	**psig**		**min**	**Comment**
00 00	0	0	surface	surface	oxygen	X	start descent
00 02	0 to 18	0 to 60	to 184	to 26.7	oxygen	2	descent completed
00 22	18	60	184	26.7	oxygen	20	
00 27	18	60	184	26.7	air	5	
00 47	18	60	184	26.7	oxygen	20	
00 52	18	60	184	26.7	air	5	
01 12	18	60	184	26.7	oxygen	20	
01 17	18	60	184	26.7	air	5	
01 47	18 to 9	60 to 30	184 to 92	26.7 to 13.4	oxygen	30	first ascent stage
02 02	9	30	92	13.4	air	15	
03 02	9	30	92	13.4	oxygen	60	
03 17	9	30	92	13.4	air	15	
04 17	9	30	92	13.4	oxygen	60	
04 47	9 to 0	30 to 0	92 to surface	13.4 to surface	oxygen	30	second ascent stage
X	0	0	surface	surface	air	X	

C5.2 Use of Table C1 The patient should breathe oxygen during descent if possible. Descent should take between 1 min and 2 min. This descent time is not included in bottom time.

Record elapsed time from the time of arrival at 18 m (60 ft).

Ascents are at a continuous bleed rate 0.3 m/min (1 ft/min). Do not compensate for slowing by subsequent acceleration. If necessary, halt ascent if rate has been exceeded. Also halt chamber if rate cannot be maintained accurately during flushing of chamber.

If symptoms recur or new symptoms appear during recompression, any ascent should be halted and medical advice sought. The diver may be returned to 18 m (60 ft) if necessary pending such advice.

Table C1 may be lengthened by an additional one or two 25-minute periods at 18 m (60 ft) (20 min O_2 X 5 min air) or an additional 75 min at 9 m (30 ft) (15 min air X 60 min O_2) or both if relief of symptoms is not complete at 18 m (60 ft).

The patient should be accompanied in the chamber by an attendant who should breathe air throughout the treatment unless it is a repetitive dive, or the table is extended. If the table is extended only once, the attendant should breathe oxygen for the final 30 minutes, i.e. ascent from 9 m to surface. If the table is extended more than once, the attendant should breathe oxygen for the final 90 minutes. In this latter case, consideration should be given to locking in a second attendant, who breathes air only, for this final 90 minutes.

Oxygen toxicity is not likely to occur on these tables, but the attendant and supervisor must be prepared. If toxicity does occur, halt ascent, remove mask, maintain depth, protect the tongue of convulsing patient, protect the patient from injuring himself, wait 15 min after fit or other reaction is over, then continue on the treatment table. If a further fit occurs, the same procedure should be followed. Advice should be sought from a medical practitioner experienced in underwater and hyperbaric medicine. A third fit is an indication to abandon oxygen breathing.

C5.3 Oxygen administration routine practices Routine practices for oxygen administration include the following:

(a) Ensure patient is as comfortable as possible.

(b) Patient is at complete rest.

(c) Ensure snug face-mask fit.

(d) Follow O_2 schedule closely.

(e) Be alert for signs or symptoms of reactions.

(f) Patient takes a few deep breaths every five minutes during treatment.

(g) Fire-resistant clothing shall be worn.

C5.4 Fire warning Danger of ignition and propagation of fires is increased under pressure. If O_2 is exhaled into the chamber atmosphere, the hazard is magnified, and an exhaust gas overboard dump system should be used when a patient or attendant breathes oxygen under pressure.

Ample ventilation must be provided. Do not use electrical appliances and keep combustibles clear of the chamber.

C6 PERSONNEL LIMITATIONS FOLLOWING TREATMENT On completion of treatment, the patient and attendant who have been under pressure should remain within the immediate vicinity of the chamber for 4 h. Both shall have access to an operational compression chamber for a further 20 h.

Following decompression sickness, a diver shall not dive until resolution of all symptoms has occurred and the advice of a medical practitioner qualified in underwater medicine has been obtained where X

(a) resolution with recompression was not rapid and complete;

(b) relapse following initial recompression occurs; or

(c) there is any doubt as to the diver's complete recovery.

No diving shall be allowed until the diver has been examined and passed as fit to dive by a medical practitioner qualified in underwater medicine.

C7 SHORT OXYGEN TABLES FOR OMITTED DECOMPRESSION Short oxygen tables, for example Table B5, shall not be used for initial treatment of decompression sickness or CAGE. They may be used for omitted decompression where the deepest missed stop was at less than 18 m (60 ft). They may also be prescribed by a medical practitioner trained and experienced in underwater medicine as a follow-up treatment of certain cases of diving-related illness after initial therapy using a longer table, for example Table C1.

APPENDIX D

MINIMUM QUALIFICATIONS FOR DIVERS

(Normative)

D1 DEGREE OF COMPETENCE The degree of competence which the diver shall have attained to be considered a `qualified' person is largely dependent upon the type of equipment or diving apparatus being employed. Clearly a diver being employed in a situation calling for the use of surface supply breathing apparatus only, need not be conversant with the use of standard helmet diving equipment. Equally, a supervisor nominated under Clause 2.1 shall be a person competent in the use of the type of equipment actually in use in addition to his other requirements of experience, competence, responsibility and initiative. The Standards detailed in Paragraph D2 are essentially minimum requirements, and no person should be considered qualified unless these Standards have been achieved.

D2 TRAINING AND CERTIFICATION OF DIVERS All divers shall be trained and certified in accordance with the appropriate part of AS 2815. The AS 2815 series of Standards consists of the following parts:

AS	
2815	Training and certification of occupational divers
2815.1	Part 1: SCUBA diving to 30 m
2815.2	Part 2: Air diving to 30 m or Part 2 (restricted)
2815.3	Part 3: Air diving to 50 m
2815.4	Part 4: Bell diving

D3 AS2815.2 Part 2 (restricted) is the appropriate minimum qualification for divers working in the tuna industry. It should be recognised that as AS2815.2 Part 2 (restricted) does not include tool competencies additional training may be required for work involving the use of specialised tools e.g.: suction pumps, water jets and power heads. It is therefore envisaged that industry specific training will incorporate tool competencies and training in safe operating procedures.

APPENDIX E

DIVER'S LOGBOOK, RECORD OF DIVE AND MEDICAL EXAMINATION

(Normative)

E1 DIVER'S LOGBOOK (Person to whom this logbook relates.)

Name:_____ Date of birth: _____

Address: _____

Change of address: _____

Change of address: _____

Change of address: _____

Instructions

No person shall be employed as an underwater diver within Australia unless X

(a) the person has been medically examined and certified fit for diving in accordance with Appendix A, by a registered medical practitioner trained and experienced in underwater hyperbaric medicine, at intervals not exceeding 12 months; and

(b) the certifications referred to above are included in the relevant section of this logbook.

During diving operations all logbooks shall be filled in and signed daily by the diving supervisor.

Company management must countersign divers' logs at least once every month.

Logbooks shall be available and produced on demand to authorized inspectors.

E2 RECORD OF DIVE

RECORD OF DIVE

Date ___/___ /19___ Vessel or Platform

Geographic location _____ Client company _____

Current _____ Visibility _____ Water temperature

Maximum depth of dive

Left surface _____ Left bottom _____ Bottom time

Type of helmet or mask used

FOR SATURATION DIVING, COMPLETE THIS SECTION

Start of saturation: (date) ___ / ____/19___ (time)

End of saturation: (date) ___ / ____/19___ (time)

Total exposure to date for this saturation: _____ h _____ min

Schedule or table used: _____ Breathing gas: _____ Rate of compression:

Storage depth: _____ Excursion depth: _____ Duration of excursion _____ h _____ m

WORK DESCRIPTION

Remarks, including any unusual aspects of dive, incidence of decompression, illness, areas affected, treatment table used.

APPROVED

Diver _____ Supervisor

Signature Signature

Diving company

E3 EXAMPLE OF LOGBOOK RECORD OF MEDICAL EXAMINATION

CERTIFICATE OF EXAMINATION of person named on this Register as to his medical fitness for employment as a DIVER.

Name of diver: _____

Date of examination: _____ Annual

Name of employer: _____

NOTE: The medical examination shall be in accordance with AS 2299, Occupational diving.

Recommendation: Fit for diving

Not fit for diving (see remarks)

Other (describe)

Remarks of medical practitioner (REGARDING ANY ABNORMALITIES, FURTHER EXAMINATIONS):

_____

_____

_____

_____

_____

_____

Signature of examining physician:

Physician's name:

Address: :

_____ Telephone:

APPENDIX F

LIFELINE AND HAND SIGNALS
(Normative)

F1 LIFELINE SIGNALS

F1.1 Manual signals In the absence of an alternative method, manual signals by line are employed for all communications in which two divers or an attendant and a diver are in physical contact, whether it be by lifeline, float line, buddy line, snagline, airpipe or breast rope.

F1.2 Types of signals Signals are of two kinds, as follows:

(a) Long, steady and distinct pulls.

(b) Short, sharp bell pulls or `bells' made with the same timing as the striking of a ship's bell.

F1.3 Pulls and bells Pulls and bells shall never be made violently.

F1.4 Signalling procedure All signals from attendant to diver are to be preceded by one pull to attract attention; the signal is then made after the diver has answered with one pull.

F1.5 Acknowledgements All signals received shall be acknowledged by repeating the signal, but not unless the signal is clearly understood. If a signal is not acknowledged or if it is acknowledged incorrectly, the person making the signal should go on repeating the signal until a correct acknowledgement is received. When a signal is being acknowledged incorrectly, the diving supervisor may decide to bring the diver to the surface to clarify the situation.

F1.6 Delays It must be remembered that a diver at work may not always be able to acknowledge a signal immediately, and the attendant shall wait a few moments before repeating the signal.

F1.7 Fouled lines If the lifeline gets fouled by turns around the shot rope it may be impossible to get signals through and the turns shall be taken out from the surface as soon as practicable.

F1.8 Interpretation of signals The attendant shall use his judgment in the interpretation of signals and shall consider the most likely meaning of each signal; for instance, when a diver is descending and the attendant knows that the diver is near his depth or job, one pull on the line means the diver has reached his depth or job. On the other hand, a single pull while the diver is on his way down means `hold on'. As it would be difficult to distinguish a single bell from one pull, one pull is included in the direction and working signals, which are otherwise bell signals.

F1.9 Two bells signals If the attendant receives two bells immediately after the diver has reached bottom, it means the diver wants slack on the shot rope taken up, and when it is properly adjusted, the diver signals `hold on' to signify that the rope can be secured inboard. On the other hand, two bells given immediately after the diver has signalled that he is coming up means he wants to be pulled up.

F1.10 Lifeline codes Two codes of signals are available; one is known as the single-lifeline code, for use when the attendant and the diver or two divers are joined by a single line, and a second when the diver and attendant are joined by two lines as in standard diving. Standard divers, however, use the single-lifeline code when the breast rope and airpipe are stopped together. These codes are shown in Paragraphs F3 and F4.

F2 EMERGENCY PULL UP This signal, a succession of pulls, shall be used only in great emergency; shall not be answered but obeyed X immediately.

F3 SINGLE-LIFELINE CODE

F3.1 Attendant to diver

General signals

1 pull	To call attention
	Are you well?
2 pulls	Am sending down a rope's end (or carrying out another action as pre-arranged)
3 pulls	You have come up too far
	Go down slowly till we stop you
4 pulls	Come up
4 pulls followed by 2 bells	Come up, hurry up, or
	Come up, surface decompression
4 pulls followed by 5 bells	Come up on your safety float

Direction signals

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

F3.2 Diver to attendant

General signals

1 pull	To call attention
	Made bottom
	Left bottom
	Reached end of jackstay
	I am well
2 pulls	Send me down a rope's end (or carry out another action as pre-arranged)
3 pulls	I am going down
4 pulls	May I come up?
4 pulls followed by 2 bells	I want to come up
	Assist me up
4 pulls followed by 5 bells	May I come up on my safety float?
Succession of pulls	EMERGENCY SIGNAL
(must be more than 4)	Pull me up IMMEDIATELY
Succession of 2 bells	Am foul and need the assistance of another diver
Succession of 3 bells	Am foul but can clear myself if left alone
4 pulls followed by 4 bells	Attend telephone/DUCS

Working signals

1 pull	Hold on or stop
2 bells	Pull up
3 bells	Lower
4 bells	Take up slack lifeline, or
	you are holding me too tight
5 bells	Have found, started, or completed work.

F4 STANDARD DIVING CODE

F4.1 Attendant to diver

General signals on breast rope

1 pull	To call attention
	Are you well?
2 pulls	Am sending down a rope's end (or carrying out another action as pre-arranged)
3 pulls	You have come up too far
	Go down slowly till we stop you
4 pulls	Come up
4 pulls followed by 2 bells	Come up, hurry up, or
	Come up, surface decompression

Direction signals on airpipe

1 pull	Search where you are
2 pulls	Go to the end of distance line
3 pulls	Face shot then go right
4 pulls	Face shot then go left
5 pulls	Come into your shot.

F4.2 Diver to attendant

General signals on breast rope

1 pull	To call attention
	Made bottom
	I am well
2 pulls	Send me down a rope's end (or carry out another action as pre-arranged)
3 pulls	I am going down
4 pulls	May I come up?
4 pulls followed by 2 bells	I want to come up
	Assist me up
Succession of pulls (must be more than 4)	EMERGENCY SIGNAL
	Pull me up IMMEDIATELY
Succession of 2 bells	Am foul and need the assistance of another diver
Succession of 3 bells	Am foul but can clear myself if left alone

General signals on airpipe

1 pull	Less air
2 pulls	More air
3 pulls	Take up slack airpipe and breast rope
4 pulls	Attend telephone

Working signals on breast rope

1 pull	Hold on or stop
2 bells	Pull up
3 bells	Lower
4 bells	You are holding me too tight
5 bells	Have found, started, or completed work

Working signals on airpipe (for use with underwater stages)

1 pull	Foremost starboard lanyard
2 pulls	Foremost port lanyard
3 pulls	After starboard lanyard
4 pulls	After port lanyard

NOTES:

1 These signals are followed by either 2 bells or 3 bells on the breast rope to indicate `pull up' or `lower'.

2 EMERGENCY SIGNAL must not be confused with the signal for `lower the after port lanyard'.

F5 HAND SIGNALS Shown here are the hand signals most commonly required for SCUBA diving.

NOTE: Variations in other underwater signals exist between training organizations. The diver should be made aware of such variations as appropriate.

Distress, help

Stop, hold it, stay there

Something is wrong

OK? OK

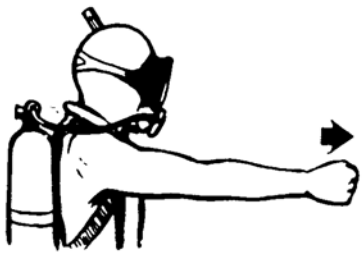
OK? OK (on surface at distance)

OK? OK
(one hand occupied)

Buddy breathe or share air

Go up, going up

Go down, going down



Danger

Out of air/danger

APPENDIX G

EXAMPLE OF TYPICAL EMPLOYER'S RECORD OF DIVE SHEETS

(Informative)

CUSTOMER _____ VESSEL _____ DATE _____

LOCATION _____ DIVE NO _____

Diver _____ Standby diver _____ Supervisor _____

Depth _____ Breathing medium _____ Table _____

Left surface	Left bottom	Bottom time	Reach surface	Total water time

	Water stops (m)														**Chamber stops (m)**					
Depth	**45**	**42**	**39**	**36**	**33**	**30**	**27**	**24**	**21**	**18**	**15**	**12**	**9**	**6**	**3**	**18**	**15**	**12**	**9**	**6**	**3**
Interval																					
Arrived																					
Leave																					

Decompression completed

Breathing supply	Pre-dive	Regulated to	After dive	Gas used
Air compressor				
Air bank				
Standby air				
Bail out				
Medical O_2				

Equipment used

Work proposed

Remarks

Hire equipment

Submitted: (Supervisor)

Approved: (Customer representative)

APPENDIX H

TYPICAL COMPRESSION CHAMBER MEDICAL KIT

(Informative)

The following is a listing of a typical medical kit for use with a compression chamber, and where medical/paramedical back-up, including ECG/defibrillator, incubation equipment, and emergency drugs are available.

Diagnostic

Stethoscope (good quality)
Sphygmomanometer X aneroid
Tendon hammer
Auriscope (otoscope)
Torch
Thermometer (normal)
Thermometer (low reading)
Tongue depressors
Cotton wool
Pens
Note paper

X mercury thermometers should not be used under pressure

Airway

Oxygen administration equipment (to supply 100% inspired oxygen)
Manual (bag type) resuscitator (for use in RCC)
Guedel airways X medium and large size
Manual or foot operated suction unit

Wound dressing

Bandages X 15 cm H 4, 10 cm H 2, 5 cm H 2
Dressings X 20 cm H 20 cm H 4, 10 cm H 10 cm H 4
Gauze squares
Triangular bandages H 4
Board splints H 2
Adhesive dressings
Adhesive stretch tape 7.5 cm H 1, 2.5 cm H 1
Antiseptic solution
Kidney dish
Artery forceps H 2
Dressing forceps H 2
Scissors X heavy shears H 1, medium dressing H 1, fine H 1
Large burn dressings H 2

Urinary catheterization

Urinary catheter foleys H 2
Anaesthetic/antiseptic jelly for catheterization
Sterile drape
Sterile gloves
Urinary drainage bag
Water for injection X 10 mL ampoule H 2
10 mL syringe
Dressing packs
Antiseptic solution

Intravenous

Intravenous cannulae X 16 g H 2, 18 g H 2, 20 g H 2
Intravenous giving set H 2
Hartmanns solution or normal saline X 1 L bags H 6
Venous tourniquet
Aqueous cleansing swabs
Tapes

Intercostal catheter
Large bore (12 g) intravenous needle
Intercostal catheter
Scalpel
Heimlich valve
Suture
Tube clamp
Local anaesthetic
Syringes and needles
Dressing pack
Antiseptic solution

General
Drinking water
Urinal
Bed pan
Toilet paper
Blankets
Towels
Vinegar

APPENDIX I

TRANSFER-UNDER-PRESSURE CAPABILITIES FOR AIR DIVING WORKSITE CHAMBERS

(Informative)

I1 INTRODUCTION Clause 4.2.2(u) requires worksite chambers to be capable of transfer-under-pressure operations. Transfer of a diver is needed either for more extensive treatment, e.g. in a larger, better-equipped or both larger and better-equipped chamber such as a hospital facility, or in case of failure or other unsuitability of the worksite chamber. Such a strategy should in practice be rarely required. It is normally possible to transport divers to an alternative chamber at sea level pressure. Should an injured diver in a worksite chamber require more advanced medical care than is available on the worksite, and should return to atmospheric pressure be dangerous, the most usual strategy is to seek additional medical aid and equipment which can be brought to the diver. In certain circumstances, however, transfer-under-pressure to a more appropriate facility may be life saving. However, transfer-under-pressure will be impossible or at least extremely difficult to effect unless suitable planning and facilities are in place to ensure compatibility and availability of all the necessary components for these operations.

In order to fulfil the requirements of Clause 4.2.2(u), worksite chambers need to be fitted with a flange suitable for connection with the type of portable chamber available in the region, either directly or via an adaptor. The type of portable chamber being considered must be capable of locking on to hospital or military or other suitable major facilities. Alternatively, if the worksite chamber is itself readily portable, either in its entirety or in part (in the case of modular systems), direct compatibility of the worksite chamber with alternative facilities may be an acceptable strategy.

I2 FLANGES

I2.1 NATO flange This bayonet type system shown in Figure I1 is the most commonly available in Australia at the time of publication. All major hospital-based chambers as well as the Naval facilities at HMAS Penguin in Sydney and HMAS Stirling near Perth are fitted with a female NATO flange, whilst all available two person, single-lock transportable emergency transfer chambers known to be available at the time of publication are fitted with male NATO flanges. Worksite chambers should, therefore, be compatible with this system unless a complete alternative strategy providing comparable capabilities is available. This system has the major advantage of providing for rapid easy connection during TUP. Points to note in relation to NATO flanges are as follows:

(a) Flange dimensions are relatively critical and new flanges should be tested for compatibility with the transport or other chambers with which TUP is intended to be possible.

(b) Worksite chamber flanges should be female unless transport of the worksite chamber for TUP directly to an alternative major (female flange) chamber is intended or unless a female-female NATO adaptor is available (i.e. one that connects two male flanges).

(c) Maximum pressure rating of NATO flanges is usually around 7 to 8 bars.

(d) Flanges and seals may be relatively susceptible to damage, and should be suitably protected. A spare seal should be available.

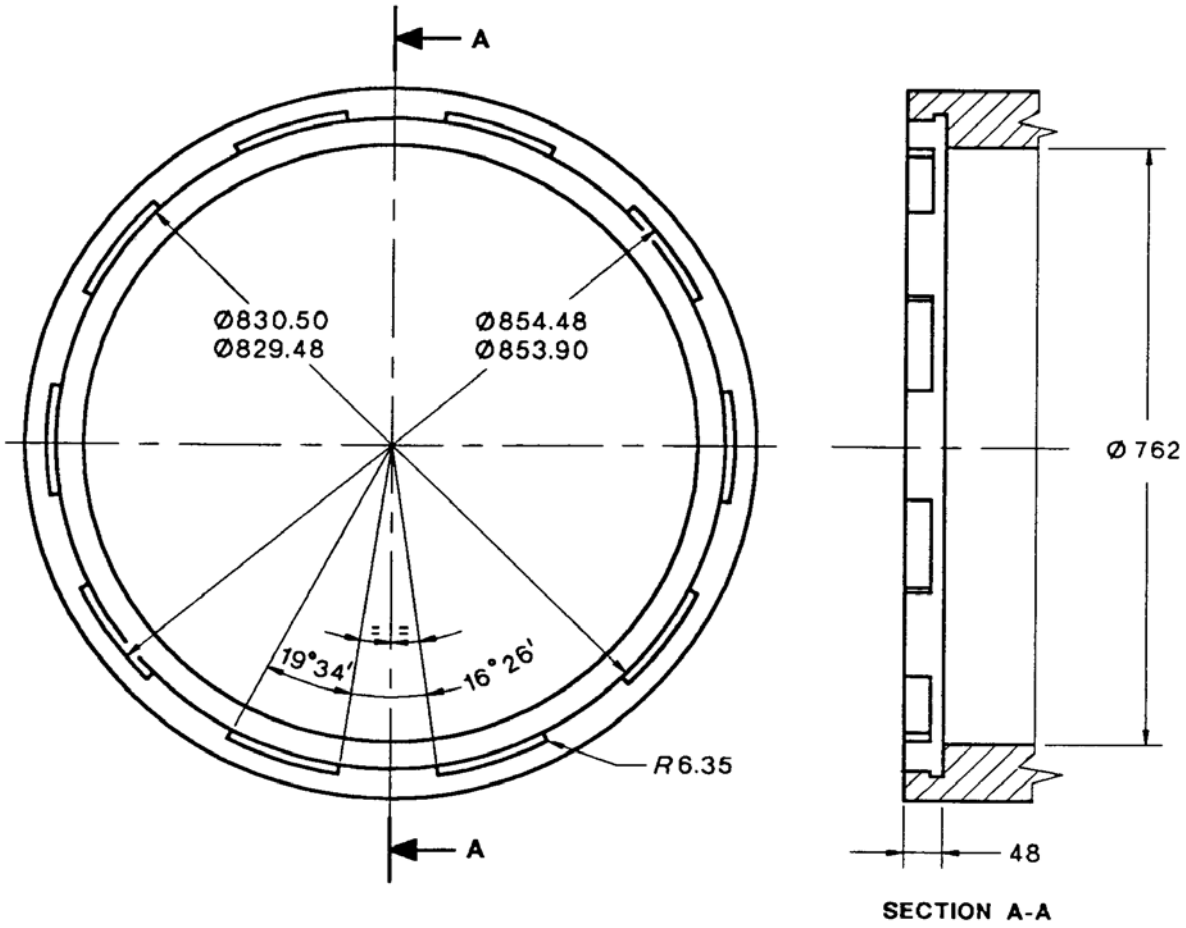
(e) If the transportable chamber with which TUP is intended is of the Drager Duocom type, the worksite chamber dimensions must allow removal of the Duocom `boot' during TUP. This requires X

    (i) a large enough chamber to allow personnel inside to remove the `boot', move the injured diver past the `boot' and refit the `boot' (chamber I.D. of 1350 mm or more usually required) and

    (ii) a large enough manway to allow removal of the `boot' (726 mm minimum I.D. unless `narrow boot' Duocom is available). Neither of these considerations apply if the transportable chamber to be utilized does not have a `boot', e.g. the `Paracel' type.

I2.2 Other flanges Worksite chambers with bolt on or other types of flanges can achieve NATO flange compatibility by the use of a suitable adaptor. This should be fitted to the worksite chamber, however, if it is not, a suitable adaptor must be readily available and capable of being fitted and tested without significantly delaying TUP. Testing of such adaptors after they are bolted or clamped onto the worksite chamber will require a `blank' male bayonet sealing plate if a portable chamber with a male flange is not readily available. Examples of adaptors known to exist at the time of publication include `36 inch' I.D. 24 bolt RAN flange to female NATO flange (in use by RAN) and `24 inch' I.D. flange to female NATO flanges (in use by several commercial operators).

I3 ALTERNATIVE STRATEGIES Worksite chambers may be used without a NATO compatible flange and arrangements for TUP using NATO flanged systems only if suitable alternative strategies exist. Such strategies should allow full intensive care to be provided to a severely injured diver in a suitably environmentally controlled chamber either as a result of the worksite chamber being equipped and designed to allow this, or as a result of alternative TUP strategies. Such alternative systems may exist where saturation diving systems are used for air diving support, and a system of worksite chamber, transfer chamber and definitive treatment facility is available using non-NATO TUP flanges.



NOTE: All dimensions are nominal

DIMENSIONS IN MILLIMETRES

FIGURE I1 GENERAL CONFIGURATION OF A FEMALE NATO N1079 FLANGE

APPENDIX J

DIVING OPERATIONS MANUAL

(Normative)

The items listed in the following paragraphs shall be addressed in the diving operations manual which shall be supplied by the employer.

J1 PLANNING Details of procedures relating to the following items are to be included in this Section of the manual:

(a) Foreseeable meteorological and oceanological conditions.
(b) Sea-bed conditions.
(c) Depth and type of operation.
(d) Suitability of plant and equipment.
(e) Availability, qualifications and experience of personnel. Special purpose training or work-up dives may be required where a diver has not dived for a considerable time or the diving operation is considered particularly demanding.
(f) Underwater hazards of the diving site.
(g) Proposed shipping movements.

J2 PREPARATION Details of procedures relating to the following items are to be included in this Section of the manual:

(a) Consultation with persons having any control over or information related to the safety of any diving operations to be carried out, in particular the control of lifting operations and shipping movements.
(b) Selection of breathing medium and equipment.
(c) Check of plant and equipment (pre-dive function testing).
(d) Allocation of personnel.
(e) Fitness of divers for underwater operations.
(f) Precautions against cold in and out of the water.
(g) Communication procedures.
(h) Precautions against underwater hazards of the diving site.

J3 PROCEDURES DURING DIVING OPERATIONS This Section of the manual is to provide details on the following items:

(a) Responsibilities of each position in the diving team.
(b) Use of all types of diving equipment.
(c) Supply of gases and gas mixtures, including maximum and minimum partial pressures of gases.
(d) Operation and use of equipment under water.
(e) Limits on depth and time under water.
(f) Descent, ascent and recovery of divers.
(g) Safe operating procedures for common diving tasks.
(h) Diving tables for use in decompression procedures for both single and repetitive dives and in therapeutic decompression procedures.
(i) Control in changing meteorological and oceanological conditions.
(j) Time that divers are to remain in the vicinity of the surface compression chamber.
(k) Maintenance of logbooks.

J4 EMERGENCY PROCEDURES This Section of the manual details the requirements for diving emergencies. Equipment and procedures to be addressed are as follows:

(a) Emergency communications.
(b) Emergency assistance under water and on the surface.
(c) Recompression and decompression.
(d) First aid.
(e) Medical assistance.

(f) Calling assistance from emergency services including advance liaison with those services, where appropriate.

(g) Precautions in the event of evacuation of the platform or vessel which include a comprehensive evacuation plan for any divers under hyperbaric pressure from initial alert stage through to completion of decompression.

(h) Procedures for the emergency secondary recovery of a stricken diving bell from the sea-floor or other obstruction.

(i) Provision of emergency electrical supplies.

APPENDIX K

MEDICAL PRACTITIONERS WITH TRAINING IN DIVING MEDICINE

(Informative)

A list of medical practitioners with training in diving medicine is maintained by the South Pacific Underwater Medicine Society, and is published periodically in its journal.

For this list contact X

The Secretary
SPUMS
The Australian College of Occupational Medicine
PO Box 2090
ST KILDA WEST VIC 3182

Specialist advice and the names of doctors qualified in diving medicine can be obtained from X

Hyperbaric Medicine Unit
Royal Adelaide Hospital
ADELAIDE SA 5000
Phone: Routine (08) 8222 5116
Emergency DES 1800 088 200 (Tollfree all hours)