Medical Examiners of Divers

Background

As you may be aware the UK Health & Safety Executive (HSE) is withdrawing from its internationally recognised scheme for the approval of non-UK based doctors to carry out annual diver medical examinations from the end of September 2001. HSE will continue to enhance its approval arrangements for doctors based in the UK.

IMCA's Diving Division Management Committee, prompted by HSE's withdrawal from this activity, agreed that IMCA should develop guidance on the requirements for doctors to undertake such periodic examinations covering:

- doctors' qualifications/experience
- equipment needs
- key elements in the medical examination.

Unfortunately, with HSE's withdrawal from the approval of non-UK based doctors, in the absence of any suitable international alternative, it is up to each diving contractor to identify doctors with such qualifications/facilities to perform annual medical examinations on divers. This note has been produced to assist IMCA contractor members to identify appropriately qualified doctors in their region.

Doctors' Qualifications/Experience

The doctor (medical examiner) of divers must be able to determine whether or not a person is fit to undertake commercial offshore diving activities by means of an annual fitness to dive medical. The doctor also needs to be able to assess a diver's fitness to return to diving after serious illness (including decompression illness) or accident, and should be able to give advice to any commercial diver, or to his supervisor, who may have concerns about fitness to dive because of some individual's problem.

Qualifications/Experience

- Fully qualified medical practitioner
- A sound knowledge of diving medicine and hyperbaric physiology
- Knowledge of scope, nature and organisation of commercial offshore diving work.

In some geographical regions there will be specific requirements regarding qualifications etc. of the individuals permitted to carry out such medical examinations. In such regions the medical examiner would be expected to meet those requirements.

The doctor would have normally be expected to have attended a suitable diving medicine course in order to gain a sound knowledge in diving medicine, and be committed to keeping up with diving medicine developments. To this end it would be anticipated that the doctor would attend an appropriate refresher training course at suitable intervals, at least every five years. In order for the medical examiner of divers to achieve appropriate competence the initial course is likely to be in the order of 25 lecture hours and 3 hours practical.

A list of organisations which might offer suitable training is given in Annex 1. This list is not exhaustive – IMCA would be interested in learning of any organisations that might also offer suitable training.

The Joint Medical Subcommittee of ECHM (European Committee for Hyperbaric Medicine) and EDTC (European Diving Technology Committee) has prepared a note on 'Training Standards for Diving and Hyperbaric Medical' which provides some useful information on modules/topics to be covered in diving medicine training.

Equipment Needs

The doctor should have access to suitable facilities for examining divers and for carrying out testing in:

- audiometry
- electrocardiography
- spirometry
- exercise testing.

Access to radiology and clinical laboratory services is also required.

Equipment used needs to be calibrated and serviced in line with the manufacturers' recommendations.

Key Elements in the Medical Examination

The medical examination should include examination in the following areas:

- morphology
- respiratory system
- cardio-vascular system
- exercise testing
- peripheral nervous system
- musculo-skeletal system
- ears
- vision
- dental
- urology
- integument
- radiology
- haematology

} as required

Some guidance on medical examinations is available at Annex 2. This reproduces the UK Health & Safety Executive's document MA1 '*The medical examination and assessment of divers*'. This is provided for **information only** so that readers can be aware of the contents of the diving medical examination standard required in the UK. It could be adapted for use in a member's company with appropriate deletion of HSE references. At Annex 3 is a reproduction of the annual medical examination form used by HSE, with HSE references removed.

Alternative guidance is provided in the *'Occupational Diving Operations Part 1: Standard Operational Practice'* Australian/New Zealand Standard, AS/NZS 2299: 1999, Appendix K). This sets out guidelines for carrying out medical examinations on occupational divers and those intending to undertake training for occupational diving. This document is available from:

Standards Australia

1 The Crescent, Homebush, NSW 2140, Australia

Standards New Zealand

Level 10, Radio New Zealand House, 155 The Terrace, Wellington 6001, New Zealand

Organisations Providing Courses in Diving Medicine

Europe

Courses complying with the 'Training Objectives of Diving and Hyperbaric Medicine' document prepared by the joint Medical Subcommittee of the European Committee for Hyperbaric Medicine (ECHM) and the European Diving Technology Committee (EDTC).

France
- Navy

Netherlands
- Navy

Norway
- NUI
- Navy

Sweden
- Navy

UK
- Institute of Naval Medicine, Alverstoke
- Department of Environmental and Occupational Medicine, University Medical School, Aberdeen
- Biomedical Seminars, Ewell, Surrey

North America

Canada
- DCIEM – Canadian Navy

USA
- USN
- NOAA (2 week course)

Asia Pacific

Australia
- Royal Australian Navy

Singapore
- Singapore Navy

New Zealand
- Royal New Zealand Navy

Reproduction of the UK Health & Safety Executive's

The medical examination and assessment of divers

INTRODUCTION

Purpose and scope

1. This document outlines HSE's medical standards for diving at work. These are used by medical examiners approved by the Health and Safety Executive (HSE) to perform statutory diving medical examinations and assessments under the Diving at Work Regulations 1997.

2. The standards are based on the physical requirements of diving work and the physiological consequences of such work. Under the Diving at Work Regulations 1997 all divers at work must have a valid certificate of medical fitness to dive issued by an HSE medical examiner of divers. The medical examiner has a duty to come to a decision on an individual's medical fitness to perform work activities while diving. The certificate of medical fitness to dive is valid for as long as the medical examiner certifies, up to a maximum of 12 months. It must be renewed on expiry if a diver wishes to continue diving at work.

3. Where an annual medical assessment is carried out less than a month before the expiry of the current medical certificate to dive, the start date of the new certificate may begin from expiry date of the current certificate.

The role of the medical examiner

4. Medical examiners need to be knowledgeable about diving work as well as diving physiology. They are therefore required to have undergone specialised training in underwater medicine and to have kept themselves up to date with developments in both diving medicine and diving practice.

The Diving at Work Regulations 1997

5. The Diving at Work Regulations 1997 are accompanied by five Approved Codes of Practice (ACOPs) covering: Commercial Diving Projects Inland/Inshore; Commercial Diving Projects Offshore; Media Diving Projects; Recreational Diving Projects; and Scientific and Archeological Diving Projects. Each of these ACOPs has been tailored to fit the needs of these different sectors of the diving industry.

6. The position of those divers at work who dive under the Media, Recreational and Scientific and Archeological Diving Project ACOPs using approved recreational diving qualifications has been considered by HSE with the help of representatives of the UK Sports Diver Medical Committee. It has been agreed that some of the medical requirements for these divers will vary from those divers who dive using commercial diving qualifications. In particular:

- the period of absence following decompression illness is different (see paragraph 12 for more details);
- the preliminary medical examination and annual medical assessment for these divers must be undertaken by an HSE medical examiner of divers. However, they do not need to have the in depth preliminary medical examination if they have already had a medical examination required by their recreational diving organisation.

Initial medical questionnaire

7. At the earliest possible stage people considering a career in diving should complete a medical questionnaire that looks at whether anything in their medical history would preclude them from a career in diving. They can check this with their GP thereby avoiding the expense of inappropriately proceeding to a full preliminary medical examination with an HSE medical examiner. Copies of the medical questionnaire can be obtained from the HSE or from one of the diver training organisations offering competence assessment leading to the award of a qualification approved by HSE.

FOR INFORMATION ONLY

Preliminary medical examination

8. After being accepted on to a commercial diver training and/or assessment course, but before beginning training, all trainees must submit themselves for a full medical examination with an HSE medical examiner of divers. The medical examiner must make potential divers aware of any health problems that may affect their future employment prospects or their long term health. A permanent record of these initial test results must be recorded and used for comparison at subsequent annual medical assessments.

Annual medical assessment

9. At intervals not exceeding 12 months all divers covered by the Diving at Work Regulations 1997 must see an HSE medical examiner of divers so that their fitness to dive at work over the following 12 months can be assessed (see also paragraph 3 above). The medical examiner's decision will be based on a careful assessment of any medical condition in relation to the requirements of the work activities that the diver will perform while diving.

10. The medical records from the preliminary medical examination and any subsequent annual medical assessment must be available for comparative purposes at each successive assessment. There is therefore a requirements for divers to produce at the time of the annual medical assessment copies of their previous medical examination and assessments unless, of course, they return to the medical examiner who conducted the previous medical examination or medical assessment.

Return to work after any serious injury or illness including decompression illness

11. Any condition or injury occurring during a diver's career may influence fitness for work. Under certain specific circumstances - any cardiac, pulmonary, neurological or otological disorder including neurological decompression illness or any condition requiring the diver to be off work for more than 14 days - a diver must present themselves to a medical examiner for re-examination for an assessment of their fitness to return to work. This is a specific examination related to the possible effects of the particular illness or injury, and does not replace the requirement for an annual medical assessment.

Recommended times away from diving

12. The recommended times away from diving after successful treatment with no sequelae are:

SIMPLE DECOMPRESSION ILLNESS, LIMB PAIN, SKIN "BEND" LYMPHATIC SWELLING, HEADACHE, FATIGUE etc	
Uncomplicated recovery	24 hours
Recurrence/relapse requiring further recompression	7 days

NEUROLOGICAL DECOMPRESSION ILLNESS	
Altered sensation in limbs only	7 days
Other - for example audiovestibular, motor, pulmonary etc	28 days

13. However, it is recommended that because of the nature of their diving patterns and profiles and the lack of supervision the time away from diving for persons diving at work in the recreational sector should be longer.

14. In anything other than a case of simple decompression illness the review should be carried out by a diving medicine specialist, or at least in consultation with one. Further advice including names of diving medicine specialists can be obtained from the HSE's Diving Medical Adviser during normal office hours. The address is HSE Scotland West, 375 West George Street, Glasgow, G2 41-K The telephone number is 0141 275 3000, and the fax number is 0141 275 3100.

Certificate of medical fitness to dive

15. On completion of the initial medical examination or annual assessment the medical examiner must give a certificate of medical fitness to dive. The certificate must state:

- the period (which must not exceed 12 months) during which the person issuing the certificate considers the person named in the certificate will remain fit to dive; and

- any other limitations as to the nature or category of diving to which it relates.

Certification of fitness with restrictions

16. Options exist for restricting certification of diving activity in terms of duration of certification, type of diving, frequency of diving and depth. Such restrictions require careful consideration to ensure that they are appropriate to the underlying medical condition and the type of diving undertaken. Details of the restrictions identified by the medical examiner should be noted on the certificate of medical fitness to dive at the time of issue.

Second opinions and additional advice

17. The medical examiner has a duty to reach a conclusion about fitness to dive. Where doubt about fitness exists consultation with other HSE medical examiners, appropriate medical specialists, or HSE's Diving Medical Adviser should take place. Advice or guidance on suitable people to contact for a second opinion is available from HSE's Diving Medical Adviser (see paragraph 14 above for details).

Review

18. Where someone is found to be unfit to dive or fit to dive only within limitations the person should be informed in general terms the reason for the finding. In these circumstances the person should be advised of their right of review by the HSE. They must apply in writing to the HSE within 28 days for a review of the case. Normally a specialist in the relevant field is consulted. The medical examiner will be kept informed.

19. Divers should submit their request for a review through HSE's Diving Medical Adviser (see paragraph 14 above for details).

Medical Records

20. The medical form is in duplicate - one copy is kept by the medical examiner; and one is given to the candidate or diver.

FOR INFORMATION ONLY

A. GENERAL MEDICAL CONSIDERATIONS

Gender

A1. In general the same fitness criteria apply to both make and female divers. The major difference between female and male divers relates to possible harmful effects that exposure to increased pressure may have on a foetus. Consequently a diver who is pregnant or who suspects that she may be pregnant should not dive.

Age

A2. There is no lower or upper age limit for divers. However, it is unusual for anyone below school-leaving age to undergo diver training and no-one under 18 is accepted for work offshore. In an older person evidence should be sought for necessity, motivation and fitness. A diver must retain the physical capacity to undertake work underwater or under pressure as appropriate. That may require greater than average fitness as age increases.

Previous medical history

A3. Before the preliminary examination is carried out prospective divers should have arranged for their general practitioner to provide a report detailing their medical history. At subsequent annual assessments further reports will only be required if there is a relevant clinical problem that requires further evaluation.

Psychiatric illness

A4. The primary considerations in all cases must include the risk to the individual's safety and/or that of those around him or her; and the risk of recurrence of psychiatric or psychological disorders. Special consideration should include the various stresses associated with the type of work, remote location and risks involved.

A5. Individuals should be free from psychiatric illness and cognitive impairment. They should not be suffering from psychological or personality problems that would interfere with their in-water safety or that of others.

A6. Disorders which, while quiescent, still exclude passing an individual as fit to dive are:

- schizophrenia;
- bipolar affective disorder;
- unipolar affective disorder; and
- disorders asymptomatic due to treatment.

A7. Disorders which, if resolved, may allow passing an individual as fit to dive are:

- adjustment re-actions;
- parasuicide;
- pre-menstrual dysphoric disorder;
- phobias; and
- isolated psychotic episodes.

A8. The use of medication should exclude passing an individual as fit to dive.

Malignancy

A9. A malignant condition should be assessed on an individual basis and will require information from the doctor responsible for the patient's care. Any such person found fit to dive is likely to require regular review.

HIV Infection

A10. A positive HIV test need not means the end of diving. In an HIV positive individual, the development of any new medical condition will require re-assessment of fitness. However, the development of the symptoms and signs of AIDS almost certainly would because of the physical problems of the condition, and would, in any case, require medical review.

Communicable diseases

A11. The medical examiner should be satisfied that the individual is not suffering from a communicable disease. If there is any doubt as to the person's fitness after such an illness, the certificate of diving fitness should be withheld until the doctor involved in the initial care of the patient has been consulted.

Medication

A12. Medical fitness to dive under medication is dependent on:

- the type of diving;
- the underlying pathology;
- the effects of medication on fitness to dive; and
- the consequences of its abrupt cessation if complications were to arise during diving.

A13. The assessment must include that of the underlying condition for which medication is being taken and which may be the most important consideration. The assessment should also consider the length of time that an individual can safely be without medication in the event of its loss. Consideration should be given to the potential for unexpected side effects as a result of interaction with pressure.

Smoking

A14. Divers should be discouraged from smoking, although it is not a bar to diving.

Alcohol, drug or substance abuse

A15. Alcohol, drug or substance abuse is incompatible with diving. With any history of this there must be doubt about fitness for diving. A lengthy period of stability without any medication should be sought as a minimum.

Diving history

A16. This is to be ascertained in detail and carefully recorded.

B. MORPHOLOGY

B1. The primary consideration is a diver's mobility, agility and overall fitness.

B2. Individuals with a Body Mass Index (weight Kg/height m^2) greater than 30% should have further assessment of body fat content by measurement of skinfold thickness at four sites.

B3. A body fat content in excess of 30% may be considered a reason for rejection until weight has been satisfactorily reduced.

C. RESPIRATORY SYSTEM

C1. The nasal airway should be free from signs of obstruction. There should be no evidence of chronic sinus disease. Clinical examination of the respiratory system should be normal. The chest should be anatomically normal. There should be no evidence of obstructive or restrictive lung disease. The gas exchange capability and the structural integrity of the lungs should be normal.

C2. Contraindications to diving are:

- acute respiratory illness;
- chronic lung disease which results in a reduction of exercise capacity;
- previous spontaneous pneumothorax;
- the presence of bullous lung disease;
- chronic obstructive airways disease; and
- chest injury, particularly penetrating injury resulting in pleural adhesions or pulmonary scarring.

C3. Where a diver has had chest surgery but is clinically fit, an opinion should be sought from a diving medicine specialist as to fitness to dive.

C4. Full size PA radiographs of the chest in both inspiration and expiration should be obtained at the preliminary examination.

C5. Spirometry should be performed at both the preliminary examination and each subsequent annual assessment. An adequate FEV_1, is important in relation to exercise capacity and as a measure of airflow obstruction. Reduction in FVC represents a risk factor for pulmonary barotrauma. The FEV_1/FVC ratio should be greater than 70% but it should be remembered that large FVCs can lower this figure. Both FEV_1, and FVC should be greater than 80% of the predicted normal value for a person of the same race, gender, height and age. Anyone not achieving these standards should be referred for specialist assessment.

C6. At subsequent annual assessments any significant change in value will likewise require specialist evaluation.

C7. European Community Coal and Steel Industry predicted normal equations are recommended.

D. ASTHMA

D1. Asthma is normally a contraindication to diving. A requirement for regular bronchodilator therapy is a contraindication to diving.

D2. However, individuals with mild asthma whose:

- lung function remains normal for most of the time and there is no reduction of exercise capacity or evidence of exercise, cold induced bronchospasm; and

- they have been asymptomatic for a considerable period of time

may be considered fit to dive even if they require regular prophylactic medication to control symptoms.

D3. A previous history of asthma in childhood is not a contraindication provided that there has been a reasonable interval (several years) since the last symptoms.

D4. Individuals with asthma require careful assessment. That is likely to include bronchial testing using cold, exercise or hypertonic saline and specialist referral. The criteria should be applied more strictly at the preliminary medical examination than to a fully trained diver who develops late onset asthma.

D5. Persons assessed with a possible diagnosis of asthma are likely to be found either fully fit or unfit. It is unlikely that a certificate of fitness with a restriction on diving activity (for example depth) would be appropriate.

E. CARDIOVASCULAR SYSTEM

E1. The function of the cardiovascular system should be such that the diver is able to sustain strenuous muscle activity at depth. There should not be an increased risk of loss of consciousness or incapacitation. Divers may be of a fitness standard which is associated with "athlete's heart".

E2. Any organic heart disease is a cause for rejection unless considered by a cardiologist to be haemodynamically unimportant. That includes all types of cardiomyopathy, ischaemic heart disease, haemodynamically important valvular disease, cyanotic heart disease and other shunts.

Ischaemic Heart Disease

E3. Symptomatic ischaemic heart disease is incompatible with diving. The requirement for medication to control a cardiac condition is a contraindication.

E4. At the preliminary examination an individual found incidentally to have ischaemic heart disease should be declared unfit.

E5. At an annual assessment, full specialist evaluation, including angiography and exercise testing, is required to assess the risk of an acute event occurring during diving.

E6. An individual who is symptom free following coronary bypass surgery remains unfit to dive. An individual who has had percutaneous transiuminal coronary antioplasty might be considered fit if:

- the procedure has been demonstrated to produce revascularisation;
- they remain symptom free;
- they have a normal cardiac stress exercise test and they can meet the physical requirements.

E7. Such individuals will require careful assessment by a cardiologist, and if considered fit will require careful follow up.

Dysrhythmias

E8. Any dysrhythmia that might cause incapacity in water will disqualify.

E9. Disorders of cardiac rhythm, except for sinus arrhythmia and infrequent ventricular extrasystoles, require specialist evaluation and are likely to be a cause for rejection, particularly at the preliminary medical examination.

Pace-maker

E10. In most cases the indication for pacing is likely to be a contraindication to diving. Careful assessment of the type of diving and type of pacemaker involved will be required and, of necessity, will require specialist cardiological advice.

Patent Foramen Ovale

E11. Examination for the presence of an intracardiac shunt is not a requirement for either the preliminary examination or the annual assessment.

E12. However, examination for patent foramen ovale can be justified in a diver who has suffered neurological decompression illness, particularly where the dive profile was not obviously contributory since it may contribute to an assessment of the overall risk to the diver of continuing to dive. A positive finding is not necessarily a reason for a finding of unfitness. However, a diving medicine specialist opinion is recommended.

Valvular Heart Disease

E13. Auscultation of the heart should be normal. Murmurs are acceptable only it deemed to be physiological. Where doubt exists referral for specialist opinion or further investigation such as echocardiography should be considered.

E14. Atrial or ventricular septal defects, aortic or mitral stenosis are contraindications to diving. Coarctation is a contraindication. Other valvular conditions, including bicuspid aortic valve, mitral valve prolapse would require cardiac evaluation. Cardiac function in terms of exercise capacity should be normal.

Blood Pressure

E15. At the preliminary examination the resting blood pressure for a young diving candidate should not exceed 140 mmHg systolic or 80 mmHg diastolic, using the fifth phase as an indicator and with the patient supine. For older candidates the effect of age should be taken into account. The possible impact of a rise in blood pressure during a diver's potential career should be considered.

E16. At subsequent annual assessments, mild hypertension would not be a contraindication provided that:

- either no medication was required or the medication taken had no implications for diving safety; and
- there was no evidence of end organ damage.

E17. Where doubt exists consult a cardiologist with a knowledge of diving medicine.

ECG

E17. A resting ECG should be performed at the preliminary examination. Any abnormality should be discussed with a cardiologist.

E18. At subsequent annual medical assessments an ECG is required only for divers aged 40 and thereafter every five years unless there is a clinical indication, for example the presence of risk factors.

Any significant change in the ECG will require further evaluation.

ECG after exercise testing

E19. An ECG should be performed after the exercise test at the preliminary examination.

E20. At subsequent annual assessments an ECG after exercise should be performed in individuals with specific risk factors for ischaemic heart disease or as clinically indicated.

F. EXERCISE TESTING

F1. Diving is a strenuous activity. A commercial diver must be able to meet the physical requirements of the task to be performed. That includes the ability to rescue a stricken diver and to effect a rapid recovery. An assessment of exercise capacity must be carried out at both the preliminary examination and each subsequent annual assessment.

F2. Medical examiners must satisfy themselves beyond reasonable doubt that the candidate is adequately fit. Where possible an assessment of maximum oxygen uptake (either direct or indirect) should be carried out.

F3. Simple tests such as a step test, a timed swimming test or a cycle ergometer test provide an adequate means of fitness. The majority of divers will be able to achieve an exercise level equivalent to 13 mets or 45 ml/kg/min (lean body mass) oxygen consumption. The results of the test should be considered together with other aspects such as blood pressure, obesity, and lung function. At subsequent annual examinations repetition of the same test is valuable to assess any alteration of fitness status. Measurement of peak expiratory flow rate (PERF) before, 5 and 10 minutes after the exercise test (other than swimming) provides a useful screen for exercise induced wheeze.

F4. See Appendix 1 for details of tests and appropriate fitness standards.

G. PERIPHERAL CIRCULATION AND MICROCIRCULATION

G1. The peripheral circulation should be capable of providing adequate peripheral perfusion even in cold conditions. Clinical evidence of impaired circulation will require further evaluation. Peripheral vascular disease may predispose to cold injury. Contraindications are:

- varicose veins associated with circulatory impairment (for example, varicose eczema); and
- conditions known to be associated with impaired organ perfusion.

H. CENTRAL NERVOUS SYSTEM

H1. Assessment of the central nervous system is one of the most important aspects of both the preliminary medical examination and the subsequent medical assessment. A careful history is essential.

H2. The central nervous system should be clinically and functionally normal. The neurological examination should be detailed and include the cranial nerves, motor and sensory system as well as balance, co-ordination, gait, proprioception, vibration sense and two-point discrimination.

H3. Assessment of central nervous function includes both physical and psychological aspects. The diver must be psychologically capable of undertaking diving activity. The diver's manner, attitude, verbal and intellectual response form part of the examination. Where doubt exists specialist clinical psychological assessment might be required.

H4. Predisposition to impairment of consciousness, convulsions, disturbances of speech, vision or motor control or disturbances of orientation and balance is incompatible with diving. Conditions which may mimic decompression illness or jeopardise safety must be sought and excluded. The baseline and variation from normal must be carefully recorded at the preliminary medical examination. In particular a history of visual, hearing, balance, co-ordination, sensory, bladder, bowel or sexual dysfunction should be sought.

H5. Any form of epilepsy is a contraindication to diving. However, in certain circumstances where a diver has been fit free for ten years without treatment they may be considered for fitness to dive. Expert assessment will be required.

H6. Contraindications are:

- claustrophobia, severe motion sickness, migraine particularly with visual, motor or sensory disturbance and excessive daytime somnolence;
- previous intracranial surgery;
- any unprovoked loss of consciousness, recurring fainting episodes other than febrile convulsions occurring up to the age of five years.

H7. There are inherent dangers in diving if there has been significant brain damage or there is a risk of post traumatic epilepsy After head injury where there has been any of:

- a depressed skull fracture;
- intracranial haematoma;
- unconsciousness or post traumatic amnesia greater than 30 minutes; or
- focal neurological signs

there is a significant risk of post-traumatic epilepsy and the person should be rejected.

H8. More minor episodes of head injury (less than 30 minutes unconsciousness or PTA) are a reason for temporary unfitness for a period of 4 weeks subject to review by a medical examiner. However, minor head injuries can cause cognitive dysfunction.

I MUSCULO-SKELETAL SYSTEM

I1. The diver must have unimpeded mobility and dexterity and must be sufficiently physically strong and agile to meet the demands of the proposed work. In particular all joints should have a normal range of functional mobility

I2. Divers with a history of back pain require careful assessment because of the risk of sudden incapacitation and sciatic pain mimicking decompression illness.

J. EARS

J1. The individual must be able to equalise pressure in both ears. Visual confirmation of eustachian function should be obtained. The ear canal should be free from obstruction and evidence of infection. Extoses are common and unless they occlude the canal are not a contraindication to diving. There should be no increased susceptibility to infection. The tympanic membrane should be intact and vestibular function should be normal.

J2. Hearing should be of a level which permits normal conversation to be understood.

J3. Audiometric covering the range of 500 Hz to 6 KHz is required at the preliminary examination. Thereafter, an audiogram should be repeated after an episode of aural baratrauma. In addition further audiograms should be carried out according to a hearing conservation programme.

K. VISION

K1. Visual acuity with or without correction and colour vision must be adequate for the type of diving activity, for example, requirement to read watch, depth gauge, tables, NDT instrumentation and so on. Colour vision is important for specific inspection tasks.

K2. Divers requiring optical correction can use a prescription faceplate if using a facemask. Soft gas permeable contact lenses have been used satisfactorily. Hard impermeable lenses are unsuitable unless fenestrated.

There is a risk of infection with all contact lenses and it may be difficult to maintain sterility in a saturation environment. The use of disposable lenses may reduce this risk.

K3. The risks associated with diving after ophthalmic surgery require careful evaluation and individual assessment in conjunction with the surgeon. Certain procedures, for example, involve the instillation of gas into the globe. It is advisable to seek the opinion of an ophthalmic surgeon to ascertain this. Experience to date has shown there to be no difficulty for divers following radial keratotomy.

L. DENTAL

L1. The diver requires a high standard of dental health. It is necessary to retain a mouthpiece and the presence of cavities may be associated with barotrauma. Unattached dentures should be removed during any diving activity.

L2. The diver should attend a dentist regularly and the dentist should be aware that the individual is a diver. Where doubt exists a certificate of dental fitness should be obtained.

M. ENDOCRINE SYSTEM

M1. Diving results in numerous neurological reflexes and hormonal responses. It is unlikely that those suffering from endocrine conditions leading to impaired thermoregulation, cardiac or muscular insufficiency would be found fit. A proven or suspected abnormality will require detailed assessment.

M2. Glycosuria would require investigation. Insulin dependent diabetes mellitus or non-insulin dependent diabetes controlled by oral hypoglycaemic agents are contraindications. Non insulin dependent diabetics treated with diet alone should be assessed on an individual basis bearing in mind the type of diving required. In such cases restricted certification should be used.

M3. Patients with thyroid diseases who have been demonstrated to be in a stable state may be fit to dive provided that they have no cardiovascular complications of the disorder.

N. GENITO-URINARY SYSTEM

N1. A history of renal disease or of urinary tract investigation will be reason for more detailed assessment. Venereal disease will debar until adequately treated. The presence of genito-urinary disease or renal tract disease associated with abnormal renal function is usually a cause for rejection. Cases of renal stones or colic should be judged on an individual basis after specialist investigation.

N2. Dipstick urinalysis for blood, protein and glucose should be undertaken routinely.

O. GASTRO-INTESTINAL CONDITIONS

O1. Gastro-intestinal function should be normal with no increased tendency to vomiting, dyspepsia, reflux, bleeding, perforation, diarrhoea or pain. Hepatic and pancreatic function should be clinically normal. Inflammatory bowel disease, gall bladder pathology, pancreatitis are contraindications to diving. The presence of an abdominal wall hernia should be a contraindication until repaired. Dyspepsia will require investigation.

O2. A previous history of peptic ulceration requires careful assessment. Objective evidence of ulcer healing and resolution of symptoms is necessary before fitness can be considered. The requirement for regular continued H2 blocker therapy for the control of peptic ulceration is not acceptable . The risk of recurrence after the successful completion of a course of triple therapy is sufficiency low to permit a diver to return to air diving.

O3. For saturation diving, successful surgical treatment could permit a return to diving after careful consideration.

O4. The presence of a stoma is likely to be compatible with limited types of diving activity of short duration.

FOR INFORMATION ONLY

P SKIN

P1. The integument should be functionally intact and without increased susceptibility to infection.

P2. Any condition which may affect thermal control is a contraindication. The prolonged periods in water and exposure to high humidity especially in saturation environments increase the risk of disabling skin infection and exacerbate many pre-existing dermatoses. Severe exfoliative disorders are contraindications. Acute or chronic infections are a cause for temporary unfitness until controlled.

Q. RADIOLOGY

Q1. See also **RESPIRATORY SYSTEM.**

Q2. Long-bone x-rays are required before undertaking saturation diving, and thereafter on clinical indication or at specific request.

R. HAEMATOLOGY

R1. Any disorder leading to significantly impaired ability to transport oxygen is likely to be a contraindication to diving.

R2. Sickle cell disease or thallassaemias are contraindications. Carriers of the sickle cell and thallassaemia traits are not believed to be at a significantly increased risk during diving.

R3. At the preliminary examination a full blood count and sickle test should be performed. No blood tests are required at subsequent annual examinations unless clinically required. Abnormal results should be referred for specialist opinion.

R4. Normal ranges for haemoglobin for males are 13-18g/di and for females 11.5-16.5g/di.

FOR INFORMATION ONLY

APPENDIX 1

ACCEPTABLE EXERCISE TESTING PROTOCOLS

Army physical fitness test.
Master two step test.
Cycle ergometer test - direct or indirect assessment of oxygen uptake.
Treadmill test - direct or indirect assessment of oxygen uptake.
Timed swimming test.

In the recording of the medical examination/assessment the method and protocol used should be defined. For example, in a progressive cycle ergometer test the duration of the test and the periods of time at each defined workload should be specified. In practice an individual doctor or centre might use a pre-printed exercise test form specifying the technique to record the result. Without being too prescriptive, it is important that some form of standardised exercise test is performed.

The Medical Examination/Assessment of Divers

Diver's Personal Details

Surname:		Forename(s):	
Date of birth:		Sex:	☐ Male ☐ Female
Permanent Address:			
Nationality		Ethnic origin:	

Examining Doctor's Details

Name:		Address:	
Telephone:		Fax:	
Signature:		Date:	
Doctor's stamp:			

Type of Medical

Type of medical: ☐ Preliminary examination ☐ Annual assessment

Date of examination:		Date of expiry of certificate of fitness (if applicable)	

Is the diver medically fit to dive?
☐ Yes
☐ No

If 'No', please explain. Record actions taken (specialist reports, discussions with approved doctors, etc.)

If 'Yes', are there any restrictions?
☐ Yes
☐ No

If 'Yes', please explain.

Medical History

Details of any illness or contact with doctors in last year:	
Details of any medication being taken:	
Smoking status:	Alcohol consumption:
Allergies:	

Diving History

Details of the diver's work history to set against the medical assessment. *To be completed for annual assessment only.*

Diving certificate number, qualifications and dates:				
Commencement date of commercial diving:				
Type of diving work undertaken:				
What breathing equipment is used:				
Diving activity in last year:	Number of air dives:		Number of days in saturation:	
Details of any diving abroad:				
Any diving-related medical problems and number of working days lost since last medical:				

***All* aspects of this medical should be conducted at the preliminary examination and each annual assessment unless specifically stated**

Morphology

Height (m):		Weight (kg):		BMI:	

Respiratory System

Examination of chest. If 'Abnormal', please give details:

☐ Normal
☐ Abnormal

	Predicted:	Actual:
FEV_1		
FVC		
FEV_1/FVC		

Cardio-Vascular System

Examination of cardio-vascular system, including heart sounds. If 'Abnormal', please give details:

☐ Normal
☐ Abnormal

BP mmHG:		Resting ECG*:		Post-exercise ECG*:	

Exercise Testing

Type of test used:	
Results:	

Central Nervous System

Examination. If 'Abnormal', please give details:

☐ Normal
☐ Abnormal

Peripheral Nervous System

Examination. If 'Abnormal', please give details:

☐ Normal
☐ Abnormal

Musculo-Skeletal System

Examination. If 'Abnormal', please give details:

☐ Normal
☐ Abnormal

** as required*

Ears (attach copy of audiogram if performed)

Examination of ears, including external canal, drums and eustachian tube function. If 'Abnormal', please give details:

☐ Normal
☐ Abnormal

Audiogram performed: ☐ Yes ☐ No

Vision

Examination of eyes and fundus. If 'Abnormal', please give details:

☐ Normal
☐ Abnormal

Dental

Examination. If 'Abnormal', dental certificate required:

☐ Normal
☐ Abnormal

Urology

Genito-urinary examination. If 'Abnormal', please give details:

☐ Normal
☐ Abnormal

Urinalysis: ☐ Protein ☐ Sugar ☐ Blood

Integument

Examination of skin. If 'Abnormal', please give details:

☐ Normal
☐ Abnormal

Radiography

Chest – PA insp. and exposure films:

Long bone X-rays*:

Haematology*

Haemoglobin: Full blood count: Sickle test:

** as required*

Please note any additional findings overleaf for future reference