The Diving Medical Advisory Committee

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Improving Diver Safety – Current Medical Issues

Report of a Workshop held on 8 October 2014 in Aberdeen, UK
Chairmen: Dr Stephen Watt and Mr Steve Sheppard

1 Welcome and Introduction

Dr Watt opened the workshop noting that DMAC was an independent body, comprising diving medical specialists seeking to provide advice about medical and certain safety aspects of commercial diving. Initially when it was formed in 1975 DMAC members were from across Northern Europe, but more recently had widened its membership by inviting participation from medical specialists based around the world – including Southern Europe, Africa, Australia, North America and the Asia Pacific region.

He further explained that the aim of the workshop was to review a number of areas of commercial diving practices where there were concerns about the potential health implications and considerable variations in operational practices. It was hoped that the workshop discussions would identify areas where there was sufficient evidence or experience to form the basis for guidance on minimum requirements and to identify areas where the lack of knowledge might be resolved by defined research topics.

2 The 'As Low As Reasonably Practicable' (ALARP) and 'As Low As Reasonably Achievable' (ALARA) Principles

Dr Jean-Yves Massimelli introduced this topic. It was noted that while the ALARP principle was embedded in UK legislation, it was not necessarily applied outside the UK. He noted that in some regions, for example the Asia-Pacific regions, oil companies might include a certain specification for diving work in the invitation to tender, but may choose the contractor on the basis of price, thus making it difficult to ensure that various elements of primary prevention as set out in IMCA guidance were followed.

He suggested that close attention was often paid to the question whether divers were fit to dive, but less attention was paid to the question of whether conditions were fit for diving. He posed the question whether DMAC action could help ensure that primary prevention was a requirement for all diving projects?

There followed a discussion from which the following points emerged:

- There was agreement that basic occupational health practice required that project design and planning should include measures aimed at primary prevention and that the involvement of the company's medical adviser or medical support organisation was an important contribution to project planning.
- The general principle was to establish a working environment where the risks were ALARP.
- It was important to recognise that basic safety measures and planning usually had a much greater contribution to diving safety than divers' medical assessments. However it was commonly observed that much greater attention was paid to medical examinations than to ensuring that conditions for diving were safe.
- It should be recognised that improving the quality of diving medical assessments was not a substitute for maintaining safe diving conditions.
- In some geographical regions, government requirements may influence the choice of diving contractor used. A number of global oil companies attempted to use common standards across the world but sometimes partnered with local oil companies.
- Responsibility for the safety of a diving operation lay with the diving supervisor and diving contractor. Obtaining 'diver consent' to work in unsuitable conditions was inappropriate and did not affect responsibility.

In relation to diving medical examinations it was noted:

- That diving medical certification standards varied globally and as a result some contractors required additional screening.
- Divers tended to operate on a freelance basis and thus were able to choose the doctor for their diving medical assessment.
- The European Diving Technology Committee (EDTC) was updating its diving medical examination standard as was the UK Health and Safety Executive (HSE).
- It was important to recognise that there was a difference between a fitness to dive assessment and the fitness to undertake the work.

DMAC, EDTC and IMCA identified different levels of diving medical physician expertise – with a Level 1 being the diving medical examiner who undertook a physical check of the diver but who did not necessarily have good knowledge of the type of diving activity to be undertaken, and Level 2D who were medical advisers to diving companies who could provide advice on specific aspects of fitness required for the particular activity to be undertaken.

The following conclusions were reached:

- DMAC to consider guidance/statement on the interpretation of the basis of medical fitness and its place and importance in the overall prevention process (primary, secondary and tertiary prevention) which involved the safe design of the project, appropriate consideration of the working environment and aspects of emergency preparedness and response.
- DMAC to consider guidance to support diving supervisors on simple practical assessments which can be observed by supervisors pre- and post- diving.
- Consideration should be given to highlighting the role of Level 2D doctors in the assessment of fitness requirements for specific projects and their role in secondary prevention e.g. drills, rescues simulations, etc.

3 Oxygen Partial Pressure in Bail-out Bottles

It was noted that this issue had been raised by Dr Olav Sande Eftedal who was unfortunately unable to attend this meeting.

It was noted that DMAC had issued DMAC 04 – *Partial pressure of O_2 in bail-out bottles* – in 1981. This guidance suggested that high pO_2 levels could be used as this would only be for a short time.

It was noted that diving contractor practices varied considerably. In Norway the bail-out requirement was such that SLS rebreathers were used.

The only advantage of a high pO_2 was when the bail-out ran out and the diver became unconscious. In most circumstances when a diver would go onto bail-out, he would be trying to recover himself back to the bell and so would not want a pO_2 level that would increase the possibility of a convulsion. If a diver's gas supply failed he would normally go onto an emergency supply – he would only use bail-out if there was an umbilical problem or a problem with his helmet.

It was identified that what was needed was data on this issue.

It was noted that Dr Eftedal had offered to review DMAC 04. Workshop attendees were asked to pass on their views to Dr Eftedal regarding this topic.

4 Saturation Decompression and Excursion Procedures

Dr Watt identified that there were a number of different saturation tables in use and that for a dives at 150 m there could be as much as two days' difference in the decompression time. Anecdotal evidence suggested that divers experiencing lower decompression times had indicated that they felt better after diving. This could indicate some decompression related stress for shorter decompressions.

With twin bell systems, longer decompression times could result in some divers only being at depth for a short time before decompressing so they could lead to a situation where some divers ended up with more decompressions for the same amount of work as other divers. Operational planning was needed to even out the number of decompressions experienced by divers.

It was noted that there was a limit of 28 days on saturation exposure, but that there was no hard evidence for the 28 day limit.

Where longer, deeper dives were undertaken, e.g. to 300 m, there were longer (i.e. not equal) times between dives and more regular diving medicals.

It was noted that a number of companies had developed their own tables over time, in conjunction with discussions with their diving medical advisers, and they would be reluctant to move to a common table. It was noted that a common table was used in Norway but this had been based on empirical data with no science backing it up.

It was recognised that data was needed and it was suggested that inflammatory markers could be used to provide additional data – this could be done by blood sampling.

It was concluded that DMAC should consider providing a statement on data collection – what should be looked for and how to measure to develop data that could look at differentiating between decompression tables.

5 Diving in Contaminated Environments

It was noted that diving contractors did not always receive information on possible contaminants. However contractors had detection systems and would use enhanced diving procedure and additional protective equipment if diving in contaminated water.

It was noted that IMCA had developed useful guidance on this topic – IMCA D 021 – *Diving in contaminated waters*. It was identified that in some regions such as the North Sea there was a mature approach where, through education and communication, information on possible contamination was generally provided. This was not necessarily the case in other areas.

There was a discussion regarding the merits of dry versus wet suits. It was recognised that hot water suits provided a barrier as the diver was provided with clean salt water throughout the dive whereas dry suits could deteriorate over time.

It was recognised that records on drill muds used and potential contamination could be difficult to source.

Dr Stein Modahl identified that Statoil was collecting information on contamination and contaminants and control methods which he could share.

It was concluded that diving in contaminated waters was a concern for DMAC and its key recommendation should be that contamination was identified before diving took place and appropriate provisions were put in place.

6 Air Diving Procedures

It was noted that a number of years ago the UK HSE brought in air diving limits which at the time were met with some concern. However most air diving in the North Sea was now shallow diving with no stop limits, and deeper (air range) diving was done from diving support vessels on saturation. However it was recognised that there may well be an increase in air diving in the wind farm industry which might lead to an increase in decompression illness (DCI).

It was noted that in the Dutch sector air diving was commonly used and contractors continued to dive in that sector without DCI issues.

It was noted that there were a wide variety of air diving tables in use and also air diver training schools appeared to use tables which were not in common use in the industry.

It had been identified some time ago that the deeper a diver dived and the longer he dived led to a higher incidence of DCI.

It was noted that the International Association of Oil & Gas Producers (OGP) was collecting diving incident data from its contractors and would be looking for any trends.

It was agreed that DMAC should not be involved in developing a new air diving table but rather should be involved in identifying the risk factors.

7 Diver Recovery into a Bell

Jerry Starling of Harkand provided an overview of the workgroup he was leading on developing IMCA guidance on this topic. The intention was that the guidance would cover a number of phases including when first identifying a problem with a diver right through to his recovery into the bell and then into the diving system. The intention was to provide good practice guidance.

He identified areas where DMAC input was considered important. These included the decision making process, rigging to recover the diver into the bell, helmet removal, cardiopulmonary resuscitation (CPR), stretchers, etc.

Dr Watt reported that he had spoken to the resuscitation officer at Aberdeen Royal Infirmary who had expressed an interest in this work. Dr Ruth Stephenson noted that she had had a number of discussions around a starting point for resuscitation in a harness and suggested that a medical workshop involving people with relevant skills should be set up to look at the effectiveness of what was available and what could be achieved.

It was agreed that terms of reference (ToR) for this work were drawn up so the scope of work was clear. Resuscitation was an important area of critical care. In this particular instance the resuscitation would be carried out in a confined space so it would need to be carried out by trained personnel who were not doctors.

It was identified that practical trials could be done using the National Hyperbaric Centre bell and these trials would help in understanding the confined space issues.

It was agreed that ToR would be drawn up and DMAC would participate in providing medical input into this work.

8 Conclusions

Dr Watt thanked everyone for their attendance and open and frank discussions. A number of issues had been identified and DMAC would consider how best to take these forward.

9 Workshop Participants

Derek Beddows	BP
Bill Brampton	NHS Grampian
Alf O Brubakk	
Phil Bryson	Abermed Ltd
Jane Bugler	IMCA
Paul Evans	Fugro
Alan Forsyth	Subsea 7
David Hutchinson	Nexen
James Wilbert Johnson	Capita – Health & Wellbeing
Anoop Kumar	NHS Grampian
Pasquale Longobardi	
Sjur Lothe	Technip
Jean-Yves Massimelli	Kreuz Subsea Pte Ltd
Stein I Modahl	Alpha Medisinske Senter AS
Nadan M Petri	Croatian Maritime, Undersea and Hyperbaric Medical Society
Simon Phillips	Institute of Naval Medicine
Jan Risberg	NUI AS
Stuart Scott	Capita – Health & Wellbeing
Steve Sheppard	Helix – Europe & Africa
Jerry Starling	Harkand
Ruth Stephenson	NHS Grampian
Michal Szypula	NHS Grampian
Rick Taylor	ConocoPhillips
Maarten van Kets	Vankets Medical Services
Stephen J Watt	
Jürg Wendling	
Adriaen Winckers	Bluestream Offshore