

DIVING PAPER

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For the past 2 years I have tried to keep you up-to-date with the progress that the United Kingdom is making in the introduction of legislation covering the safety of offshore diving. You may remember that the United Kingdom introduced the Offshore Installations (Diving Operations) Regulations of 1974 on the 1st January 1975 and these were followed very quickly by the Merchant Shipping (Diving Operations) Regulations in March 1975. Last year in July we introduced the Submarine Pipelines (Diving Operations) Regulations 1976. These three sets of Regulations now cover all the diving to do with offshore oil and gas exploration and exploitation in the British sector of the European Continental Shelf. The reason for this piece-meal introduction was pure expediency. During this year it is our intention to replace these various pieces of legislation by a common diving safety regulation which will include not only the offshore industry but also diving in docks, harbours and inland waters.

Last year I gave you the broad details of the fatal diving accidents that had occurred in the whole of Northern Europe since 1971 in operations associated with the oil and gas industry. You may remember that the total for fatal accidents from 1971 until the end of 1975 was 25. I would dearly have liked to have come here this year and told you that that figure had not changed. Unfortunately in 1976 we had 9 fatal diving accidents offshore.

It is never pleasant to talk about accidents but I believe that the salient points and the lessons learned from accidents should be made public so that everybody concerned can do their best to avoid making the same mistake again.

In January 1976 a diver was lost whilst operating at a depth of 480 feet. His death was due to drowning and, without going into too much detail it would appear most likely that his main gas supply valve in the diving bell was accidentally shut. This is why we have banned the use of ball valves for such systems unless they can be secured positively open or shut. The diver concerned was carrying an emergency bale-out bottle but did not use it.

Again in January 1976, a diver was lost and another diver very seriously injured when a diving bell accidentally surfaced. Once again we learned a lesson from this accident. The diving operation was being conducted from a comparatively small vessel and to avoid the ship movement being imparted to the bell through the lifting cable, the bell weights were so arranged that they hung below the bell and could be lowered to the sea bed and the main lifting cable slackened off. However, during the diving task it was necessary to move the diving bell. During this operation the bell accidentally surfaced with the bottom door open. Subsequent investigation showed that some types of seabed conditions can create a tremendous suction on a weight or anchor or weight array far in excess of the actual weight of the ground tackle.

In May last year a diver was drowned whilst operating in 120 feet of water due to the fouling of his umbilical in a tide way.

Another diver died from pulmonary barotrauma after a dive to 120 feet. This was possibly due to a dormant weakness in his chest.

Another diver was lost through drowning whilst diving on air at a depth of 120 feet. We are having considerable difficulty in pinpointing the actual cause of this accident, but there are indications that suit inflation gas should not be taken from the breathing system.

In July of last year another diver was lost whilst operating from a barge in the North Sea and this was almost certainly due to his main gas supply becoming disconnected at his mask. The design of his particular equipment negated the value of his bale out bottle under these conditions. I cannot say more as a prosecution has been initiated.

In November two divers were lost in what can only be described as a surface interface accident. After returning to the surface both divers received injury through contact with the anchor bolster or cow-catcher of the installation and drowned.

On Christmas Eve another diver was lost on the surface and this is still being investigated.

We are still in the process of analysing the figures that we have to date, and of course this must be a continuous process. The figures suggest a broad breakdown of reasons something like:

human error	19
poor physical condition	3
inadequate training	6
equipment failure	9
lack of equipment	3
inadequate medical supervision	2
poor diving supervision	11
poor equipment maintenance	4
surface interface weather conditions	5
inadequate decompression schedules	nil

You will appreciate that quite often there are more than one or two reasons for an accident occurring.

In addition, as I told you last year, cold has certainly been a contributing factor in at least three and probably many more cases. Because of this, one of the first amendments to the diving regulations is going to require external body heating for dives deeper than 50 metres, and in addition, respiratory gas heating deeper than 15 metres.

As a result of investigations into the various accidents, near-miss reports and research programmes the Department of Energy issued 20 diving safety memoranda in 1976. They covered such things as advice on diving from small craft and vessels, advice on the diving bell weight systems, the use of high pressure oxygen in diving breathing systems, advice on medical emergencies, defects found on commercial breathing equipment, first aid medical emergency equipment that should be available, danger from suction on ballast weights or diving bells, the use of self-contained underwater breathing apparatus, advice from a jury during an inquest, advice on diving with suppressed cathodic protection on offshore installations, faults found in the gas supply systems, advice on the design of lifting harnesses for a bell diver, advice on the need to test pre-mixed gases etc.

The problem of bone necrosis is one that the industry has to face but I am pleased to say that all the indications at the moment are that this disease is not nearly as bad as we once thought it might be for the deep diving industry. In the United Kingdom, bone necrosis is accepted as one of the conditions arising under one of the prescribed industrial diseases for which the industrial injuries benefits of the Social Security Act can be paid.

These regulations apply to inshore diving only at the moment but will be expanded to cover the offshore industry.

When a person contracts necrosis it will have to be registered and apart from the industrial benefits that may be available it should also help to clear the air in cases of litigation. I believe that this is a very positive step in the right direction.

We are continuing to study the problems of evacuation of divers in saturation or long decompression. There are two philosophies that have to be considered; does one provide a seat in a lifeboat for everybody or does one accept the modern air travel technique where, of course, parachutes are not provided for every passenger.

History tells us that in a majority of evacuation incidents the personnel concerned would have been safer to have remained on board. I also dread the idea of a diving bell or compression chamber being cast adrift in North Sea weather conditions. These pressure vessels are not designed for this. Perhaps, in the long-term future such a technique might be entertained. At present our main effort should be concentrated on prevention.

The proposed technique of transferring a casualty from offshore to a pressurised hospital onshore is another matter that is taking up much of our time. The medical world supports the concept and would like any doctor going offshore to attend a "civil engineering type accident under pressure" to have the choice of dealing with the patient in the chamber on the rig or transferring him under pressure to better facilities. Unfortunately, the engineering involved is not simple, the space necessary is not always available and the cost, not only of transferring a patient, but continuously maintaining a hyperbaric hospital operating theatre and all the associated medical teams in deep diving practice is not cheap. One also has to consider the high pressure nervous syndrome problem that may be encountered by the medical teams.

The consideration of all these problems leads us to the action that can be taken at present. The first need is to maintain life. This may require resuscitation, control of bleeding, injections, etc. Under saturation or long decompression situations immediate first aid can only be given by the divers themselves.

The arrival of a medical doctor can, in the North Sea, take from 2 to 6 hours. In other parts of the world it could take days. The doctor then has to go under pressure and, depending on the depth, speed of pressurisation and the doctor himself will depend how long, having reached bottom, before he can be of any use. This leads me to the firm conclusion that ALL DIVERS MUST BE HIGHLY TRAINED IN FIRST AID AND KEPT IN TRAINING. This should be a minimum requirement. If the diving team contains a para-medical, if the rig medic is also a diver, if all the divers can set up a drip etc. these are all bonuses. One must face the fact that it is going to be the divers themselves who provide that very important initial medical care.

I am at least pleased to tell you that civil engineering type accidents and trauma with divers is minimal.

In the United Kingdom it is the duty of the employer of divers to secure that arrangements are made under which emergency services, at all times while diving operations are being carried out, are able to proceed, by the most suitable fast forms of transport to the location of the operation in the event of an emergency which threatens the safety, health or welfare of any divers. Within the next few months a centralised diving medical emergency service will be established in the United Kingdom.

It is quite unnecessary for me to repeat the statement that diving is a hazardous operation and that diving in the offshore industry is even more so.

One could of course, make diving absolutely safe by stopping it. However, it is one of the hard facts of life that no machine or technique has yet been designed or invented to replace completely the human under water.

The question then arises, for whose protection should diving regulations be designed? There is absolutely no doubt in my mind that diving legislation, and the diving inspector's task to ensure that the legislation is implemented, is for the safety of the diver, a man under water first and foremost. It is also another hard fact of life that the interface between the Diving Inspectorate, the operational diver and the diving companies must be very close. From our experience of operating the offshore diving regulations for the last 3 years it has become obvious that close liaison with the diving companies and the divers themselves is essential. We have also found it essential for the diving inspectors to have a sound background knowledge of all types of diving and that they keep themselves up-to-date with the new techniques which are being introduced almost daily. This rapidly expanding technology also requires flexibility in legislation to permit the introduction of new and often safer diving techniques. We have found that the power to provide exemptions from certain parts of the regulations is absolutely essential.

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#### APPEALING...OR APPALLING?

Professor Carroll Wilson, former general manager of the US Atomic Energy Commission and now at the MIT, said in Sydney recently that there was a plan to dump atomic waste on a Pacific Island. So far no island had been chosen but it would need to be one far from habitation and earthquake zones and acceptable to the major powers (he didn't mention lesser powers!). The waste would need to be heavily protected and regularly checked and be placed either in the ground or in, say, 15 metres of water to act as a radiation shield. He found the idea "immensely appealing". While this is possibly an advance over previous dumping in the Mediterranean and into Atlantic canyons or down into the deep water strata in America, it will be regarded as a possible Health Risk by many who are ignorant of the benefits of radiation in the food chain that originated in the Oceans. Still, we can take comfort in the words of Professor Willard Bascon, quoted in a newspaper report as a "research engineer and pioneer scuba diver". "You can't pollute the ocean. There's too much of it. You can barely add enough to detect, to say nothing of damaging it". He then said that frantic cries that the seas are dying resulted from television productions more inclined to drama than fact.

Perhaps Cousteau and the others need a course in marine ecology ...

#### THE HISS OF LIFE?

When Adelaide reptile farm owner Joe Bredl transported some of his specimens in sacks in his truck he forgot that the term "peer group pressure" could be translated to mean that those at the bottom of the pile get squashed.

He was dismayed on arriving at his destination to find that his favourite taipan, the deadliest snake in Australia, had seemingly expired. Never one to fail a friend in need, Joe pushed a straw down the snake's windpipe and revived it by EAR methods. Could you successfully resuscitate a friend?