my hand but in the process of trying to shake off the tentacles, the coverall cuff came undone which exposed my inner forearm which was also stung. The pain was intense and can best be described as like red hot wire being pressed against the skin.

On arrival at the surface there were red welts where I had been stung. Vinegar was used and the pain and welts rapidly disappeared with no visible evidence after about 30 minutes. One of the dive crew jokingly remarked that, if I started getting electrical shocks, I could go and join my colleague in hospital. Within 30 minutes I was experiencing intermittent shocks from my fingers and toes which progressed to violent muscle spasms, chest pain, visual disturbances and generally feeling like I had insulted Mike Tyson. This time I definitely knew it was not DCS related.

I was transported to the Naval Hospital where I was admitted and spent the next 4 days. The treatment consisted of large amounts of intravenous fluids, infused anti-histamines and cortisone injections with pethidine for the pain.

In hindsight it was interesting to note the similarity of symptoms with the sting of this particular jellyfish and CNS DCS symptoms. Our divers now know that hyperbaric treatment of jellyfish stings is not appropriate. Our fist aid kit now contains injectable antihistamine and corticosteroid, which we hope will never be needed. I have not been able to determine what type of jellyfish was responsible. Perhaps a SPUMS member may be able to decide from the symptoms listed.

In Des Gorman's lectures to my DMT course we were told to look beyond the obvious for other causes of similar symptoms. Very sage advice.

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*The following report of inquest findings was provided by Mr E R Wessling, the Cairns Coroner, with permission for publication from the Human Rights and Administrative Law Division of the Queensland Department of Justice and Attorney General, GPO Box 149, Brisbane, Queensland 4001.*

## INQUEST INTO THE CAUSE AND CIRCUMSTANCES SURROUNDING THE DEATHS OF NICOLE HEIDEMARIE AHRENS AND FIONA WONG FINDINGS

**Key Words**

Barotrauma, cerebral arterial gas embolism, death, legal and insurance, pulmonary barotrauma, recreational diving.

For the purpose of assisting the relatives and lay persons at this inquest I indicate that where an inquest into a death is held, it is held for the purpose of establishing, so far as practicable, the fact that a person has died, the identity of the deceased person, when, where and how the death occurred and the person, if any, to be charged with murder, manslaughter, the offence of dangerous driving causing death or any offence set out in Section 311 of the Criminal Code as might be appropriate to the particular circumstances.

The Coroners Act requires that a Coroner give his or her findings in open Court and that the findings shall set forth so far as has been proved who the deceased was, when, where and how the deceased came to his or her death, the persons, if any, committed for trial. Subsection 5 of Section 43 provides that a Coroner shall not express any opinion any matter outside the scope of the inquest except in a rider designed in an appropriate case to prevent the recurrence of similar events.

No findings of a Coroner may be framed in such a way as to appear to determine any question of civil liability or as to suggest that any particular person is found guilty of any indictable offence or simple offence. So it is important that it be understood that any comments I make here on the evidence and the findings are made with those matters in mind.

The inquest is in relation to two diving incidents that occurred upon the Great Barrier Reef. The first occurring on 24 August 1994 at Upolu Cay involving the vessel *Sanduria* operated by Kevin Martin and Elizabeth Martin under the name of Sanduria Sail and Dive. The later occurring on 2 December 1994 at Michaelmas Cay involving the vessel *Compass* operated by John Heuvel under the name of Hostel Reef Trips.

This inquiry follows a more recent inquest conducted by myself into snorkelling activities undertaken by charter boat operators upon the Great Barrier Reef. The findings of that inquiry resulted in the implementation of a Code of Practice for Recreational Snorkelling.

The deaths of Nicole Ahrens and Fiona Wong have raised concerns about the present Code of Practice pertaining to recreational scuba diving which has become

the subject of this inquiry. It should be remembered that although my comments relate to practices that existed in 1994 at the time of these deaths, they remain nonetheless relevant to present day practices. My belief in that regard has been reinforced from inquiries currently being undertaken into further deaths that occurred this year.

Before proceeding further with my findings, I emphasise for the benefit of the next of kin and remind those concerned that no longer will there be such an intolerable delay in completing inquiries into reef deaths. I am pleased to say that my previous recommendations to ensure an early disposal of these coronial matters have been implemented by those agencies concerned.

The evidence given at the inquest has highlighted the apathy that exists on the part of those persons involved in providing scuba diving activities on charter in open waters upon the Great Barrier Reef. The daily routine of tasks performed by operators and staff has led to complacency. Safety standards have been lowered and whether it be an instruction or otherwise the risks involved are being played down to passengers. The paying passenger is given no perception of the dangers involved and far too little is done to point out the risks of death or likely injury to health.

This is not surprising, of course, given the emphasise that is placed on the fact that it is a commercial venture.

One has to look no further than the evidence of Nicole Marie Walter to see how far some operators will go. Nicole, a young student at the time, was on a school excursion on board the vessel *Compass* that day.

She was encouraged to go scuba diving despite completing a medical questionnaire that she suffered from fainting spells. No inquiry was made by staff to assess her condition. Even more disturbing was the evidence that she was encouraged to pawn her ring to pay for the dive only to redeem it a week later from the charter operator, Hostel Reef Trips.

I shall diverge for a moment to address a further aspect relating to this school excursion trip.

Prior to going on this excursion each of the parents were asked to complete a questionnaire and consent form. The evidence of the Woree High School Principal, Mr Reich, is that all of the parents' forms were vetted prior to the boat trip and it was known that only one student had permission to go scuba diving. Yet, despite some 8 to 10 teachers assisting him with supervision of the students I am told that they were unable to prevent other students from going scuba diving.

It is cause for concern when the operator fails to take adequate precautions but it becomes of greater concern that those involved in the Education of our young people would place their lives at risk by not undertaking proper supervision and failing to adhere to the wishes of the parents.

I will provide the Hon. the Minister for Education with a copy of my findings and a transcript of the evidence of Mr Reich and Nicole Marie Walter for such action as he may deem necessary to ensure the future safety and welfare of students on such excursions. Medical clearances should be provided by students before the Education Department undertakes responsibility for school diving excursions.

Evidence adduced concerning the operations of the other vessel "Sanduria" by Sanduria Sail and Dive, has done little to improve the image of the industry. The operator had no maintenance schedules in place or records for the respective pieces of breathing apparatus at the time of the incident.

Documented procedures outlining responsibilities for scuba diving instructors and dive masters and diving procedures as recommended in the Code of Practice could not be provided at the time. The operator was unaware of the medical status of both Mr Coombe and Mr Melton who had been employed as dive instructor and dive master respectively. In fact, Mr Coombe was not in possession of a certificate indicating that he was medically fit to dive as recommended in the Code of Practice.

Whilst there have been other contributing factors to the deaths, the underlying cause has been "inexperience" on the part of the student participants. Until such time as those involved in this industry come to accept this fact and take appropriate precautions then it will be inevitable that further deaths will occur.

The inquest has heard that training agencies such as PADI go to extraordinary lengths to ensure that students are initially introduced to scuba diving in a controlled environment such as a swimming pool and yet, our community allows totally inexperienced people to dive in open waters far from emergency support services and sometimes in less than ideal weather conditions

Of course, there will always be those persons who accept the risks in exercise of their right to free choice. However, I see no reason why the industry should participate by failing to provide adequate supervision and counselling that results in emergency and other services being utilised at a high cost to the community.

I would prefer to see a situation where no scuba diving takes place in open waters until the person has undergone an introductory course in a controlled environment on shore and has been pronounced medically fit to undertake diving.

If that is unpalatable or not to be achieved and continued support is to be given to the current situation, then I recommend that the following legislation be introduced and changes made to the Code of Practice for Recreational Diving in an endeavour to reduce similar occurrences in the future. I canvass the changes in numerical order as follows:

1 The deaths of Nicole Ahrens and Fiona Wong occurred as a result of a barotrauma. On the evidence there was a failure in both instances to exercise direct supervision. Nicole Ahrens was relatively inexperienced having allegedly dived only once before and Fiona Wong having no experience at all. It appears that something occurred either in the manner of use of their equipment or otherwise which has caused them to panic and rise quickly to the surface. A barotrauma as we have heard occurs upon the diver re-surfacing quickly without exhaling which in layman's terms causes the lungs to expand and burst resulting in death. Once again, it is "inexperience" which causes the person to panic and of course, basic human instinct takes over causing the diver to return to his or her natural environment at the surface as quickly as possible.

   Accordingly, I RECOMMEND that in-water supervision ratios in open water be restricted to a maximum of 4 students to one dive instructor or one dive master in respect of recreational divers who have undertaken an introductory course prior to open water diving and 2 divers to one dive instructor or one dive master in respect of those divers who have undertaken no prior introductory course.

   I FURTHER RECOMMEND that the ratio of 4 students to one dive instructor or one dive master be observed with respect to divers who have limited experience e.g. only 3 to 5 previous dives undertaken.

   I make no distinction between dive instructor and dive master. Despite their qualifications, he or she can only come to the assistance of a limited number of divers at the one time. I make no distinction between rough and ideal conditions. It is farcical to suggest it makes a difference if a person panics under ideal or rough conditions. The current ratios of 8 and 10 to 1 for Recreational Divers in Training and 4 and 6 to 1 for NonCertificate (Resort) Courses are a proven failure to date and cannot be sustained. As the inquest has shown, a ratio of 4 to 1 did not achieve the required supervision with respect to these incidents. On two occasions, the dive instructor in the case of Ahrens left other divers to go to the surface to assist the deceased on one occasion, and her husband on the other occasion, with weight belt problems. In the case of Wong, the diving instructor left other divers to surface and assist the deceased with BCD problems.

   An additional problem with supervision arises from the wonderful attractions of the Great Barrier Reef which lure divers to wander off and become complacent. Nothing but the utmost diligence is required from dive instructors and dive masters to ensure "direct" supervision is maintained at all times

   The attitude of the instructor on board the vessel *Compass* towards supervision is alarming and should be a real concern to the operator and the industry as a whole. I refer to that conversation which the deceased and her friend, Monica Ng, had with the instructor immediately before the dive and I quote "We asked the instructor how deep we would go down this time and he told us about 10 metres but we didn't want to go down that deep. The instructor told us that we didn't have to follow him down that much if we don't want to". What was he going to do? Just leave them there!

2 In addition to the reduction of ratio of divers to supervision, I RECOMMEND that a system of voice communication or a technique called budding banding be adopted. Voice communication between the instructor below and the vessel on the surface would provide for an early warning system with respect to divers in trouble enabling the instructor to call for help and assistance. Time has been shown to be of the essence in such situations and any system which can reduce delay in rendering assistance must be considered. Buddy banding would also ensure that the group remains together and reduces the risk of persons wandering off. These techniques are canvassed in the evidence of Brian MacDonald Marfleet.

3 The inquest into these deaths resulted in an examination of the equipment used. Whilst the evidence does not disclose that the equipment used contributed directly to the death of these persons, it did show that the upkeep of the equipment was far from satisfactory. The Code of Practice for Recreational Diving, at paragraph 2.4 on page 14, sets forth guidelines to be implemented with respect to equipment. I am not satisfied from my inquiry that charter boat operators have been embracing these guidelines with any enthusiasm.

   The guidelines are expressed in open terms e.g. what are "appropriate inspections"? It has been brought to my attention in the evidence of Mr Marfleet that manufacturer's instructions and Australian standards are not based on the type of usage that the diving equipment receives in the activities conducted by charter operators. Numerous people undertake scuba diving on a daily basis seven days per week on board

these vessels operating out of the port of Cairns. It has been difficult to set any period for service of equipment based on the limited evidence available to me at the inquest but I would venture to suggest that regulators should be serviced at least every 14 days and other equipment at least once a month.

In any event, I RECOMMEND that legislation be introduced by way of amendment to the Workplace Health and Safety Act and Regulations to ensure that charter boat operators maintain a schedule of inspection and repair records for all diving equipment. That all diving equipment carry a serial identification number that can be related to the schedule. That all diving equipment including regulators be inspected within a period set by the Hon. the Minister for Employment and Industrial Relations as he may deem fit.

4 Finally, the issue of medical questionnaires has arisen during the inquest. On the evidence before me, I find it difficult to perceive how such questionnaire serves a useful purpose at the present time. It would seem on the evidence that charter operators principally use such forms to tack on a clause to merely absolve themselves from liability with little or no regard to the medical disorders declared by passengers. Both the forms used by the charter operators and that approved under the Code of Practice are defective in one very important aspect.

The questionnaire invites the person to disclose medical disorders particularly those listed thereon, but does not set out distinctly whether it is safe to go scuba diving if one happens to tick YES to any of those particular medical disorders.

As stated by Dr Deakon, persons suffering sinusitis as disclosed by the deceased, Fiona Wong, in her medical form and persons suffering from fainting spells as disclosed by Nicole Walter in her medical form should not dive. It could prove fatal to do so.

I also note that medical questionnaires suggest that you should seek your own medical advice. Where does one get qualified medical advice once the form is suddenly handed to you on board the vessel at sea?

I RECOMMEND an immediate review of the prescribed medical declaration to include words which clearly indicate and give advice to the passenger that if you have ticked YES to any of the medical disorders listed you MUST not scuba dive. My suggestion of the wording is "The medical disorders listed on this form are incompatible with safe diving and places yourself at real risk of death or permanent injury to health. If you have ticked YES to any of the questions you MUST not undertake scuba diving".

I FURTHER RECOMMEND that legislation be introduced by way of amendment to the Workplace Health and Safety Act and Regulations that the prescribed medical declaration must be made available by charter boat operators and completed by passengers prior to diving.

I FURTHER RECOMMEND that the Code of Practice for Recreational Diving provide that employers encourage staff to strenuously advise passengers not to undertake scuba diving in circumstances where medical disorders are either disclosed, made known or are observed.

In addition, greater public awareness programs to the dangers of diving with a medical disorder should be undertaken by the tourism industry as a whole in co-operation with local authorities.

I now move to my formal findings required under the Coroners Act as I alluded to at the outset.

In relation to the diving incident on 24 August 1994, I find that the deceased was one Nicole Heidemarie AHRENS, a female person aged 40 years who formerly resided at Rothenhauschaussee 17A, 21029 Hamburg, Germany.

I find that the deceased, who was a passenger on board the charter vessel *Sanduria*, died on 24 August 1994 at the Cairns Base Hospital as a result of injuries sustained in a diving incident that occurred at Upolu Cay upon the Great Barrier Reef off Cairns on 24 August 1994.

I find the cause of death to be

1 (a) salt water drowning
(b) pulmonary barotrauma air embolism and mediastinal haemorrhage.

In relation to the diving incident on 2 December 1994, I find that the deceased was one Fiona Hang Ngor WONG, a female person aged 36 years of age, formerly of Canada.

I find that the deceased who was a passenger on board the charter vessel *Compass* died on 3 December 1994 at the Cairns Base Hospital as a result of injuries sustained in a diving incident that occurred near Michaelmas Cay upon the Great Barrier Reef off Cairns on 2 December 1994.

I find the cause of death to be

1 (a) cerebral artery gas embolism
(b) severe pulmonary barotrauma.

Upon consideration of all the evidence adduced in this inquest, I find that there is not sufficient evidence upon

which I would commit any person for trial in relation to these deaths. No person is committed for trial.

Copies of the transcript of the relevant evidence together with a copy of these findings to be delivered to the appropriate Ministers of the Crown to which I have referred.

The Inquest is closed.

E R Wessling
Coroner
16 May 1996

*The following has been provided by Mr Brian Marfleet,Workplace Health and Safety Inspector, to inform SPUMS members of the changes to medical certification requirements which came into force in Queensland on 2/7/97.*

**SAFETY LINK**
**Medical Examinations for Underwater Divers**
**Information for Doctors**

**Purpose**

To advise doctors who carry out diving medical examinations on people involved in underwater diving of the -

- requirements under the ***Workplace Health and Safety (Underwater Diving Work) Compliance Standard 1996***

and

- the recommendations given in the **Advisory Standard *"Code of Practice for Recreational Diving and Snorkelling at a Workplace"***

**What the Workplace Health and Safety (Underwater Diving Work) Compliance Standard 1996 requires**

The *Workplace Health and Safety (Underwater Diving Work) Compliance Standard 1996* requires employers, self-employed people and workers doing any type of underwater diving work to hold a **current certificate of medical fitness** to dive. This applies to all types of diving work.

**What is a current certificate of medical fitness to dive?**

A current certificate is one that is less than 12 months old which has not expired, been revoked or superseded. People doing underwater diving work will need to have an annual medical examination to obtain a "current" certificate.

A certificate *of medical fitness to dive* is a certificate that -

a on its face is issued by a doctor who has satisfactorily completed training in diving medicine approved by the Board of Censors of the South Pacific Underwater Medicine Society (SPUMS); and

b contains the following information -
- the name of the person who holds the certificate
- the date the certificate was issued
- shows that the person is medically fit to dive according to the fitness criteria in AS 2299 1992 *Occupational Diving*, appendix A, paragraph A3
- any limitations on diving imposed by the doctor.

While AS 2299-1992 fitness criteria specify a minimum age of 18 for divers, the compliance standard allows persons under the age of 18 to hold a certificate of medical fitness to dive as there are circumstances where a person under the age of 18 may wish to do underwater diving work. Whether a person under 18 is declared fit to dive or not is a matter for the doctor's discretion. The type of diving work the person intends to do may be a relevant factor in assessing whether the person is fit to dive.

If the person is under the age of 18, the doctor may issue a certificate but the certificate must show -

- that apart from being under 18, the person is medically fit to dive in accordance with AS 2299-1992, appendix A, paragraph A3 and no limitations on diving are needed even though the person is under 18; or
- that apart from the limitations on diving stated on the certificate, the person is medically fit to dive in accordance with AS 2299 - 1992, appendix A, paragraph A3. The certificate must show which, if any, of the limitations are imposed because the person is under 18.

As employers, self-employed people and workers who do underwater diving work must hold a certificate that shows the above information, it would be useful if doctors issuing certificates made sure all the relevant information is shown on the certificate.

**Training in diving medicine**

The compliance standard requires the certificate to be issued by a doctor who has satisfactorily completed training in diving medicine approved by the Board of Censors of SPUMS.