IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

Court Reference: COR 2012 005122

FINDING INTO DEATH WITHOUT INQUEST

Form 38 Rule 60(2)
*Section 67 of the **Coroners Act 2008***

I, ROSEMARY CARLIN, Coroner having investigated the death of KAREN YOKE MING LEE without holding an inquest:
find that the identity of the deceased was KAREN YOKE MING LEE
born on 18 October 1969
and the death likely occurred on 7 July 2012
at the S.S. Coogee Wreck Site near Point Lonsdale, Victoria

from:

1(a) DROWNING

Pursuant to Section 67(2) of the *Coroners Act 2008*, I make these findings with respect to the following circumstances:

1. Ms Karen Lee was born on 18 October 1969. She died on 7 July 2012, aged 42, whilst scuba diving. At the time of her death Ms Lee resided in Preston. She is survived by her sister, Audrey, and other family members.

2. In preparing this Finding I have had regard to a range of materials and information as follows. I was provided with a brief prepared by Victoria Police which included statements obtained from Ms Lee's sister, a friend, witnesses and various experts. I consulted with the Coroner's Prevention Unit and the Investigating Member, Leading Senior Constable (LSC) Mark Braun, himself an experienced Self Contained Underwater Breathing Apparatus (SCUBA) diver. I considered the various Standards and Codes of Practice applicable to operators in the SCUBA diving industry.

3. I also held a mention hearing on 11 December 2014 in order to determine whether to hold an inquest. Mr Jason Salter, the owner and managing director of Dive Victoria Group Pty Ltd (Dive Victoria) attended and gave evidence. His legal counsel tendered Dive Victoria's Operations and Procedures Manual and made submissions. At the conclusion of the hearing I indicated I was satisfied that I could conclude my investigation by way of a chambers finding.

Ms Lee's disappearance

4. Ms Lee was a recreational SCUBA diver. In 2009, she completed a medical diving assessment and commenced a PADI Open Water diving course. On 24 June 2011, she successfully completed an Aquability Advanced Open Water certificate allowing her to dive to a maximum depth of 30 meters.

5. Ms Lee's log books indicate a dive history between 17 April 2009 and 18 February 2012. During this time a total of 55 dives were recorded and Ms Lee amassed a total of 37 hours bottom time (time from leaving the surface to the time ascent is commenced). The records indicate that Ms Lee undertook six dives exceeding 23 meters depth, four dives exceeding 28 meters and one dive of 30 meters.

6. On 7 July 2012, Ms Lee embarked on two SCUBA dives with Dive Victoria departing from Portsea. Dive Victoria was (and is) a dive charter and training business operating in Port Phillip Bay. The weather was fine and sunny with a light offshore breeze, making idyllic winter diving conditions.

7. Ms Lee's dive buddy was Nicholas Bessell-Brown with whom she had been diving since June 2011. They had completed nine dives together. Mr Bessell-Brown always kept a close watch on Ms Lee when they dived because he had observed that she often had problems with buoyancy control. They each had their own equipment, including gas cylinders.

8. At 11.20am, Ms Lee and Mr Bessell-Brown entered the water at a site known as the North Wall. They dived to a depth of 26 meters and the current was strong. Originally they had planned to dive for 45 minutes, but they cut their dive time short as Ms Lee's cylinder was low on air. During the ascent, Ms Lee ascended too quickly and missed her safety stop. Mr

Bessell-Brown tried to slow her down, but had to let go when he realised he would be dragged to the surface with her. Their total dive time was 30 minutes.

9. Back on the boat, dive supervisor Steve Plant spoke sternly to Ms Lee about her uncontrolled ascent. Ms Lee claimed to have had trouble operating her deflator button on her buoyancy control device (BCD). She then demonstrated to Mr Plant that she could locate and activate the deflate mechanism on her BCD and so he permitted her to undertake the second dive.

10. In between dives, the boat travelled between Portsea and Queenscliff to accept more passengers and allow divers to refill their cylinders. At some point Ms Lee's cylinder was refilled. Mr Bessell-Brown watched Ms Lee for any signs of having ascended too quickly, but she appeared fine and was insistent on doing the second dive.

11. The second dive was at the site of the SS Coogee, a wreck in 33 - 35 meters of water situated 4 kilometres from the shore between Point Lonsdale and Ocean Grove. Before the dive Ms lee and Mr Bessell-Brown checked each others equipment. Mr Plant also checked the equipment of each diver and did a safety briefing which included the location of the shot line, ascent rates and procedures in the event a diver ran out of air. The divers were then dropped near the shot line.

12. Ms Lee and Mr Bessell-Brown entered the water at 2.24 pm. They had planned to dive to a maximum depth of 30 meters, but Ms Lee exceeded this and landed on the sand at the bottom. Mr Bessell-Brown then swam down to Ms Lee and took her back to 30 meters.

13. As a result of exceeding 30 meters, Mr Bessell-Brown changed their dive plan by shortening the length of time spent at the bottom. He signalled to Ms Lee to commence ascent with him and they both did so. Mr Bessell-Brown was paying particular attention to his gauges because of the breach of their planned depth; however, he still noticed that Ms Lee's ascent rate varied. At times, she was level with him, but then she would fall below or rise above him. This was not unusual.

14. At a depth of 11 meters, Mr Bessell-Brown was monitoring his depth and turned his attention to his gauges for about 15 seconds. When he looked up, he could not see Ms Lee. He last saw her about 3-4 meters below him. He looked around for her, but had to complete his

decompression stop and then resurface, as he had less than 20 BAR remaining in his tank. Ms Lee did not resurface from the dive.

15. When Ms Lee did not resurface, all the divers on the boat did a bubble check on the surface and two divers volunteered to dive down to search for Ms Lee but could not find her. Police Search and Rescue squad (SAR) were notified and commenced searching. Despite extensive land, air and sea searches over the next few days, Ms Lee was not found.

16. Marco Di Leo, a diving instructor with various diving qualifications, was conducting advanced training for a particular student on the same Dive Victoria charter boat as Ms Lee and Mr Bessell-Brown. He and his student completed the same dives as Ms Lee. Whilst on the boat he noticed that Ms Lee appeared underdressed for the conditions in that she was wearing a 7 mm wetsuit, whilst most divers were wearing dry suits. She and Mr Bessell-Brown also only had single tanks whereas most divers had twin tanks. Further, whilst on the Coogee Wreck dive, Mr Di Leo thought that Ms Lee's position in the water and diving technique suggested that she was inexperienced.

Subsequent investigation

17. On 8 July 2012, a police underwater remote operated vehicle with camera and sonar recording capabilities collected imagery of a large shark in the immediate vicinity of the SS Coogee wreck.

18. On 9 July 2012, SAR divers, including LSC Braun, located dive equipment on the ocean floor about 50 meters from the boilers of the wreck. The equipment included a dive cylinder attached to a BCD and weight belt. The integrated quick release weight pockets on her BCD had all weights intact. The position of the equipment reflected a diver lying on his or her back facing the surface and was the expected position of a scuba diver who had drowned still wearing his or her equipment. The equipment had distinctive damage in the form of rips, tears and fraying consistent with shark bites. Three strands of hair were located with the dive mask.

19. A further inspection of the dive equipment revealed that the quick release mechanism of the clip on the weight belt was in the closed position. The tongue of one end of the synthetic belt had been fed through the buckle but was then cleanly severed. The detached tongue of the

belt was damaged and remained inside the quick release clip. The shoulder and waist buckles on the BCD and cummerbund were in the closed position yet the material attaching the clips had sustained damage. There was a distinct unpleasant odour emitted from the equipment upon removal from the water. LSC Braun recognised this odour as the same odour emitted by deceased persons recovered from water.

20. On 12 July 2012, Mitochondrial DNA profiling of the hair found attached to the dive mask was conducted by Victoria Institute of Forensic Medicine. Comparison to DNA obtained from a mouth swab from Ms Lee's sister confirmed that the hair came from Ms Lee.

21. On 3 June 2013, the dive equipment was conveyed to the Marine and Atmospheric Research Section of the CSIRO in Hobart, Tasmania. Marine researcher and shark expert, Barry Bruce conducted a series of tests on the equipment and produced a very thorough report in which he confirmed that the damage to Ms Lee's diving gear was inflicted by one or more sharks. Mr Bruce concluded that the close proximity of all the retrieved gear is consistent with an attack to Ms Lee whilst she was lying on her back on the sea floor, *not* a mid water attack.

22. Ms Lee's wrist mounted dive computer was not recovered. Without this computer LSC Braun was not able to accurately comment on her ascent rates or bottom time, although he noted that Mr Bessell-Brown's dive profile details was unremarkable.

23. Inspection of the recovered 10.5 litre dive cylinder revealed that it contained 4.5 litres of water. This indicates that the cylinder was depleted of all air and then filled with water as a result of negative pressure. Inspection also revealed that Ms Lee's cylinder had a hydrostatic test date stamp of 5/2011 meaning that it was 2 months out of test date as at July 2012. Further, the cylinder contents gauge was found to over-read by between 10 to 15 Bar.

24. LSC Braun noted that the position of Ms Lee's equipment on the sea floor indicated that Ms Lee did not drop her weight belt or release her integrated quick release weight pockets from her BCD. Although rapid and uncontrolled ascents carry the risk of decompression illness, in a situation where a diver has exhausted their oxygen supply, common teaching is for the diver to drop their weights to assist with ascent. In short, the risk of drowning outweighs the risk of suffering a decompression illness.

25. I am satisfied having considered all of the evidence before me that no further investigation is required. Victoria Police reported no suspicious circumstances. I am satisfied that Ms Lee drowned. I am satisfied that she succumbed to marine life only after she drowned. It is not possible to determine the precise reason Ms Lee drowned. The evidence indicates Ms Lee had difficulty managing her buoyancy during her ascent. It is possible this lack of control caused her to sink to the bottom and run out of air. It is also possible than she ran out of air on the ascent and then sank to the bottom.

26. I formally find that Ms Karen Lee died on 7 July 2012 from drowning.

COMMENTS

Pursuant to section 67(3) of the *Coroners Act* 2008, I make the following comment(s) connected with the death:

1. Inspectors from the Victorian WorkCover Authority (VWA) attended the workplace of Dive Victoria Group Pty Ltd ('Dive Victoria') on 17 July 2012 and viewed their documented procedures, Code of Practice and booking program which contained information regarding divers, including which divers may not be suitable to specific dive sites. No issues were identified with Dive Victoria's system of work in so far as it related to the safety and welfare of members of the public and no improvement notices were issued.

2. Hydrostatic testing of gas cylinders is important to test for structural integrity. Australia has one of the most stringent requirements for hydrostatic testing. Some other jurisdictions only require testing of steel cylinders every 3 to 5 years. Although Ms Lee's cylinder had not been hydrostatically tested within the required period, I am satisfied this fact is unlikely to have contributed to Ms Lee's death. Her cylinder was only two months out of test date and I accept the evidence of Mr Salter that the main risk of a cylinder lacking structural integrity is rupture or explosion, not water ingress. Further, any water in the cylinder would almost certainly have been detected when the cylinder was refilled.

3. Dive Victoria had facilities to refill cylinders at both Queenscliff and Portsea and it would seem likely that Dive Victoria refilled Ms Lee's cylinder. However, as Dive Victoria charges for this service it keeps appropriate records and it has no record of refilling Ms Lee's cylinder. Further, I am satisfied that Dive Victoria staff are appropriately trained and instructed not to refill

cylinders out of test. It is therefore possible that Ms Lee refilled her cylinder at an external site, or less likely, that she was carrying a spare cylinder.

4. Ms Lee held an Advanced Open Water Diver SCUBA certification and had completed 55 dives prior to 7 July 2012. It is concerning that despite her formal qualifications and practical experience, she appeared to lack proficiency, particularly with her buoyancy control. It is also concerning that once she got into difficulty she did not follow the basic protocol of jettisoning weights to bring her to the surface quickly. This case suggests the need for periodic post-qualification testing for competence.

5. Although Dive Victoria dropped shot lines at both dive sites, the lines were not used by Ms Lee or Mr Bessell-Browne during the ascent. It is advisable for divers to use these shot lines during ascent to help maintain control. In the event they do not ascend on the shot line, divers should deploy a surface marker buoy (SMB) during their ascent. This would give notice of their location and assist in any rescue efforts. The evidence indicates that neither Miss Lee nor Mr Bessell Browne deployed a surface marker buoy.

6. SCUBA diving regulation is very complex, involving a combination of Australian Standards, state-based voluntary and compulsory codes of practice and Occupational Health and Safety legislation. Whilst it appears guidance exists for divers and dive operators in Victoria as to best practice in many situations, the complexity of the regulatory framework may make compliance and enforcement difficult.

7. Whilst I hesitate to add to the already complex system of dive industry regulation, this case highlights two areas of potential improvement from a safety perspective. I am grateful to DSC Braun for his input in this regard.

RECOMMENDATIONS

Pursuant to section 72(2) of the Coroners Act 2008, I make the following recommendation(s) connected with the death:

1. That consideration be given by Standards Australia and relevant stakeholders to amending the Australian Standards so as to require periodic assessment of qualified SCUBA divers in key techniques including, but not limited to, buoyancy control.

2. That consideration be given by Standards Australia and relevant stakeholders to amending the Australian Standards so as to require Dive Charter operators to ensure divers carry a SMB and are instructed to use it appropriately.

I direct that a copy of this finding be published on the internet and be provided to the following:

The family of Ms Karen Lee;
Senior Constable Braun, Investigating Member, Victoria Police;
Victorian WorkCover Authority;
Divers Alert Network;
SCUBA Divers Federation of Victoria;
Dive Industry of Victoria;
Standards Australia and
Interested Parties.

Signature:

ROSEMARY CARLIN
CORONER
Date: 5 January 2015