MAGISTRATES COURT *of* TASMANIA

CORONIAL DIVISION

Record of Investigation into Death (Without Inquest)

Coroners Act 1995
Coroners Rules 2006
Rule 11

(These findings have been de-identified in relation to the name of the deceased, family, friends, youths and others by direction of the Coroner pursuant to s57(1)(c) of the Coroners Act 1995

I, Olivia McTaggart, Coroner, having investigated the death of SR

Find, pursuant to Section 28(1) of the *Coroners Act* 1995, that:

a) The identity of the deceased is SR, date of birth 26 June 1961;

b) SR died whilst hookah diving in the circumstances set out below;

c) The cause of death was drowning; and

d) SR died on 18 December 2019 at Sandy Cape, Tasmania.

In making the above findings, I have had regard to the evidence gained in the investigation into SR's death. The evidence includes:

- Tasmania Police Report of Death;
- Affidavits verifying life extinct and identification;
- Opinion of the forensic pathologist who conducted the autopsy;
- Toxicology report of Forensic Science Service Tasmania;
- Affidavit from the wife of SR;
- Affidavit of CM, godson of SR;
- Affidavit of Lucas Burton, witness to the diving incident;
- Dive Equipment Report from the Diving and Hyperbaric Medicine Unit, Royal Hobart Hospital prepared by Corry Van den Broek, Hyperbaric Facility Manager, and Karl Price, Hyperbaric Technician;
- Affidavits from attending police officers and ambulance paramedics;
- Medical records for SR;

- Forensic and photographic evidence; and
- Investigation report of the investigating officer, Senior Constable Chris Williams of the Marine and Rescue division of Tasmania Police.

Background

SR was born in New Zealand on 26 June 1961. He was aged 58 years and lived with his wife at Montumana in North West Tasmania at the time of his death. SR had four siblings. He grew up in the Bay of Plenty, New Zealand. He attended local schools, qualified as a butcher and then worked in that industry. In 1981, SR fathered a daughter but at the time of his death he did not have contact with her. In 1985, SR met and married his wife. In 1997 they moved to Queensland and had two daughters. SR worked in an abattoir. He later commenced work as a mechanic before qualifying and working as a boilermaker welder. Tragically, in 2006, one of his daughters was killed in a motor vehicle crash. In 2017, the family moved to Montumana. SR then took casual positions at local milking farms and undertaking wood-cutting. He subsequently worked at McCain's Foods factory in Smithton and was employed there at the time of his death.

SR's wife stated in her affidavit that her husband had owned many boats over the years, was a keen diver and fisherman and would regularly spend time on and in the water. He did not have any training or formal diving qualifications, but she described him as a careful diver who avoided inclement weather conditions.

SR owned and used diving equipment, including a hookah compressor. His wife said that SR took good care of his diving equipment and would "test and retest" it months in advance of when it was required.

SR's wife said in her affidavit:

> *"SR purchased a second hand compressor in winter 2019 from an experienced diver in Hobart. Once SR had picked it up he spent the weekend cleaning out the compressor and making sure there were no blockages and that the hoses were all in good working order. I know there were bits of hoses in my shed where he had cut the hose down and replaced it as it was no good in that section.*
>
> *SR tested the compressor multiple times and then took it out with CM where SR stayed on land and CM went diving just to check that it was working correctly. SR never mentioned to me that it wasn't working correctly and I know that he wouldn't have used it or let CM use it if it was no good."*

The reference to "CM" in the passage above is to the godson of SR.

Despite his experience, it is unclear upon the evidence whether SR had a sufficient appreciation of all relevant principles relating to diving safety and proper maintenance of hookah equipment.

Circumstances surrounding death

At 3.30am on Wednesday 18 December 2019, SR and CM left SR's residence at Montumana and travelled to Sandy Cape on the West Coast of Tasmania. The purpose of the journey was to go diving at a location known as "The Island" near Sandy Cape. SR took a Honda all-terrain vehicle ("the ATV") with him on the trip.

After arriving at the location of Temma, SR and CM transported themselves and their diving equipment on the ATV as they travelled to Sandy Cape. The track to Sandy Cape is a four-wheel-drive track only. It comprises soft sand, rough areas and river crossings. The journey is about 100 minutes in duration. On the track, the ATV became bogged. However, they were able to seek the assistance of a camper, Lucas Burton, to tow the ATV out of its bogged position. All three men then travelled out to the dive site, arriving at 9.30am.

SR and CM then set up the hookah compressor diving system whilst Mr Burton left to make some phone calls from a nearby spot with mobile phone reception. The evidence reveals that upon arrival at the site SR and CM discovered that they had forgotten the extended breathing hoses (or snorkel) which assisted with drawing clean air into the compressor. Upon realising this, they positioned the compressor so the exhaust was downwind from the air intake. It was positioned on the rear of the ATV, parked approximately 40 metres from the water, with the hose reel on the ground nearby. The hose reel comprised 148 metres of hose at the end of which was a "T-connector" which split the hose to allow two divers to use the same air source. This provided each diver with a further hose extension of 20 metres.

SR and CM changed into full dive gear and entered the water, using the hookah compressor to allow underwater breathing. SR's dive gear comprised a wetsuit, facemask, weight vest, fins, a glove, hood, catch bag and knife.

Both divers left from the shoreline and began diving in water thought to be approximately 5 to 7 metres in depth. CM collected rock lobster whilst SR held the catch bag. CM did not notice anything untoward about SR during this process.

They had been diving under water for around 30 minutes when CM turned to give SR a number of rock lobster but could not locate him nearby. CM ascended to the surface and observed SR 5 to 10 metres away struggling in the kelp. He saw SR go below the surface

before ascending again, yelling that he needed help and waving his arms around. His regulator was no longer in his mouth. CM swam to SR and put his own regulator in SR's mouth. SR descended below the surface again and became limp. CM then removed SR's weight belt and dragged him to a small rocky island in the middle of the dive location. There, he commenced CPR upon SR, who remained unresponsive.

CM was joined by Mr Burton who also assisted before returning to the shore and contacting Ambulance Tasmania. This call was made at 11.00am and the operator provided instructions for CPR, which continued for a long period without response. Ultimately, Ambulance Tasmania advised CPR to cease as SR exhibited no signs of life.

At 1.10pm the rescue helicopter arrived and SR was confirmed by a paramedic to be deceased.

The investigation

The ATV, hookah compressor and some of the dive equipment was recovered by the police officers who attended the scene that day. The following day, dive operations commenced in hazardous swell and sea conditions to recover additional items. SR's hookah hose and regulator were retrieved from the dive location. Both of these items were entangled in the thick kelp and it took three divers a period of 20 minutes to free them. It was noted that SR's regulator was recovered a distance of approximately 85 metres from the compressor located on the shore. SR's weight vest and face mask were recovered from the seabed.

SR was formally identified at the scene by CM and transported to the Hobart Mortuary. Dr Jane Vuletic, forensic pathologist, performed an autopsy that same day. In her report, Dr Vuletic summarised her conclusions as follows:

> *"The deceased suffered a collapse while hookah diving and was unable to be resuscitated. It is likely that the immediate cause of death was drowning. The cause of the collapse was not established by post mortem examination. There was evidence of pre-existing pathology (cardiac dilatation likely secondary to morbid obesity) which is a risk factor for cardiac arrhythmia (cardiac rhythm disturbance). An alternative mechanism of collapse may have been immersion pulmonary oedema, the term given to pulmonary oedema which develops during immersion in water. Other causes of collapse include pulmonary barotrauma and equipment failure (for example malfunction in the air delivery system causing hypoxia)."*

An analysis of SR's blood revealed no alcohol or illicit drugs present at the time of the death.

The investigation revealed that the hookah compressor, hose reel and both regulators were purchased by SR during the winter of 2019 on the second-hand online marketplace, Gumtree. It appears that SR had dived only once previously with the equipment.

The equipment was examined by experts at the Diving and Hyperbaric Medicine Unit at the Royal Hobart Hospital who provided a comprehensive report for the coronial investigation. In the report it was noted that the compressor appeared to be home-made with a makeshift air reservoir connected to the compressor. The authors of the report commented that the compressor itself looked dated and weathered but appeared to be well put together. However, they detected various issues with the system which may have impacted upon the safety of the divers. These issues were as follows:

- The filtration system was not designed for and was inadequate for a diver breathing air. There was no suitable filter material within the filtration unit to remove contaminants. Any contaminants would therefore be compressed in the reservoir from which the diver breathes. Additionally, due to the very rusty state of the gauze particle screen, rust (iron oxide) would be one of the contaminants.

- There was no snorkel to draw fresh air into the compressor, thus increasing the risk of the diver breathing carbon monoxide exhaust gas.

- The extremely long air hose totalling 173 metres in length meant provision of a lower air flow/pressure to the divers. This would seriously affect the amount of breathing air available and would also be compounded by the depth of the dive and the depth and usage of the buddy diver. With such hose length, a situation could arise where there is not enough air for one or both divers to inhale.

- When tested, the regulator used by SR had very little flow compared to the regulator used by CM. The experts noted that SR's regulator was a scuba regulator and unsuitable for hookah diving due to not being designed for low-pressure application. It was designed for air to be delivered to it at a higher pressure than the hookah system could supply, thus making breathing from this regulator much more difficult. CM's regulator, however, *was* correctly designed for low-pressure application and testing demonstrated that it was operating properly.

I accept the expert conclusions and analysis contained in the very helpful Diving Equipment Report.

Two further circumstances that may have contributed to SR's death have been considered in this investigation.

Firstly, SR was morbidly obese[1] and likely lacked the requisite degree of diving fitness. A diver in good aerobic condition typically uses less air than someone who does not exercise regularly. Further, he is likely to have expended considerable energy and physical exertion ascending from the seabed to the surface without a buoyancy control device to assist him float to the surface or maintain his buoyancy on the surface.

Secondly, there was a large amount of bull kelp in the dive location where SR's dive equipment was recovered. Bull kelp is not uncommon on the west coast of Tasmania. It grows from the seabed and through the water column onto the surface. The large flat blades on the surface move with the waves and swell, acting like a ceiling between the water surface and ambient air. There are significant risks in hookah diving in the midst of kelp. These include the umbilical line becoming entangled in the kelp, thus limiting the movement of the diver or pulling the regulator from the diver's mouth. The diver may also be prevented from breaking the surface upon an ascent due to the thick kelp. Even if the diver is able to surface in such circumstances, the kelp may restrict the movement of fins and arms.

Conclusions regarding cause and circumstances of death

I am satisfied to the requisite standard that SR died of drowning whilst he was hookah diving. Nevertheless, there is some difficulty in determining exactly the circumstances in which his drowning occurred.

The investigating officer in this case, Senior Constable Chris Williams, is himself a very experienced police diver. In his comprehensive report to me, he summarised his opinion of the most likely scenario resulting in SR's death as follows;

- During the dive, SR struggled to gain adequate air from his regulator. This was due to a combination of lack of physical fitness, inappropriate regulator, excessive hose length and an amount of air already being drawn from the system by CM;

- As a result of not receiving enough air, SR ascended to the surface in a panicked state, and removed his regulator;

- Once on the surface, he struggled for buoyancy due to the presence of his weight-vest, lack of buoyancy device and being amongst a bed of bull kelp; and

[1] As categorised by the forensic pathologist, noting that SR was 180 cm in height and 136.7 kg in weight

- SR ingested water as he was pulled below the surface. In his panic, he did not remove his weight vest which contributed to pulling him below the surface. He therefore continued to ingest water, became unconscious and drowned.

I agree that circumstances such as those postulated by Senior Constable Williams are the most plausible to explain SR's death. It is also possible, however, that SR experienced a cardiac arrhythmia which led to his drowning. However, it is difficult to see that his drowning death might be solely due to a cardiac condition, with no part played by the obviously unsafe hookah equipment and other factors mentioned. It might be possible that his inability to breathe adequately through his unsuitable regulator contributed to a cardiac event which, in turn, led to his drowning. It is also not clear how SR came to be in the kelp bed or whether his body or any of his gear became entangled in the kelp. I cannot determine whether SR suffered barotrauma (damage to body tissue cause by a rapid ascent) as the post mortem CT scan was conducted more than 8 hours after death. Thus, reliable information regarding the likely existence of pulmonary barotrauma could not be obtained. It remains possible that barotrauma from a rapid ascent caused or contributed to death.

For these reasons, I cannot positively determine the precise combination of circumstances immediately preceding SR's drowning.

Comments and recommendations

Unfortunately, coroners are regularly required to investigate deaths involving unsafe hookah diving equipment. Hookah diving is common amongst commercial and recreational divers in Tasmania. The hookah system is relatively cost-effective and provides for a continuous air supply which only stops when the motor powering the compressor ceases to operate. Another attraction of hookah diving is the ability to access underwater areas, such as smaller fissures, without bulky scuba equipment. Further, hookah systems may be home-fabricated, such as that purchased by SR. Unlike scuba diving, there is no requirement to hold any qualification or have any formal training prior to purchasing or using hookah diving equipment.

In the study *A 20-year analysis of compressed gas diving related deaths in Tasmania, Australia*[2], the authors found that a large percentage of Tasmania's recreational divers use hookah equipment, and that hookah divers may be overrepresented in Tasmanian diving accidents and fatalities.

The authors of the study emphasised that, in respect of all hookah diving deaths during the period of the study[3], the compressors were in disrepair and/or had inappropriate or hazardous configurations which were apparent before divers entered the water. They stated *"Key issues for hookah equipment were use of home-made apparatus, hazardous air intake and air hose setups, disconnections, use of y-connectors in diver air hoses, absence of an accessory air supply and excessive weighting of divers. Hookah divers also dived without buoyancy compensators, preventing stabilisation at the surface in an emergency".*

There are currently no governing regulations in this state imposing standards for hookah diving equipment and formal qualifications for divers are unnecessary. There may be good reason for introducing regulatory oversight of recreational hookah diving, and an inspection system to assess apparatus safety and maintenance schedules.

I do not intend in this investigation to make formal recommendations. However, the need for regulatory oversight of hookah diving will likely be considered in detail by coroners investigating similar deaths, if appropriate to do so.

Divers must be aware that their hookah apparatus is a life support system when they are under water, and it must be fit for purpose, well-maintained and produce adequate supply of good quality breathing air.

In relation to the question of diving fitness, it appears that SR had not visited a doctor in the two years before his death. There is no evidence that he had ever undergone a specialised diving health assessment. The study to which I have referred found that health issues contributed to almost one half of the deaths studied. Divers should consider regular diver medical reviews, especially those with known medical conditions or those aged over 45 years.

Finally, I note that an excellent educational video has been produced by MAST in conjunction with the Department of Diving and Hyperbaric Medicine at the Royal Hobart Hospital in order to promote hookah diving safety. The video can be viewed at https://mast.tas.gov.au/safe-boating/marine-safety-guides-and-tips/hookah-diving-safety/ .

The video is a good reminder to recreational hookah divers of the risks and critical safety precautions. Those involved in recreational hookah diving should take the time to view it. Agencies and bodies involved in this area should also continue to promote this video and promulgate safety messages for hookah divers generally.

[3] 1 January 1995 to 31 December 2014.

I extend my appreciation to investigating officer, Senior Constable Chris Williams, and the experts who provided assistance in this case.

I wish to convey my sincere condolences to the family of SR.

DATED: 11 April 2024 at Hobart in the state of Tasmania.

Olivia McTaggart
CORONER