STATE CORONER'S COURT
OF NEW SOUTH WALES

Inquest:	Inquest into the death of Nicholas Banfield
Hearing dates:	9 October 2017
Date of findings:	4 December 2017
Place of findings:	NSW State Coroner's Court, Glebe
Findings of:	Magistrate Harriet Grahame, Deputy State Coroner
Catchwords:	CORONIAL LAW – Carbon monoxide poisoning
File numbers:	2016/201801
Representation:	Mr Ben Hart (Sergeant) – Advocate Assisting Mr Hutchings of counsel for the Roads and Maritime Service (RMS)
Non publication orders:	Pursuant to section 74, I order that there be no publication of the name of Mr Banfield's companion at the time of his death. The initials NL may be used. There is to be no publication of any detail of her medical treatment.

Findings:

Identity

The person who died was Nicholas Banfield.

Date of death

He died between 1 July 2016 and 3 July 2016.

Place of death

He died on board the yacht, Aquarius, which was moored off Balmoral Beach, Sydney.

Cause of death

He died of carbon monoxide poisoning.

Manner of death

His death was accidental.

Recommendations:

To the Minister for Roads, Maritime and Freight

I recommend,

Urgent consideration of the introduction of legislation to mandate carbon monoxide alarms in all recreational and leisure craft and vehicles with sealable cabins, including sailing and motor vessels, caravans and motor homes, that have potential carbon monoxide sources such as fuel burning heating and cooking appliances. These alarms should conform to an appropriately developed minimum standard. Consideration should also be given to the introduction of other compulsory safety mechanisms such as prominent warning stickers. Any system introduced should include provision for checking and enforcement.

To Transport for NSW (TfNSW)

I recommend,

That Transport for NSW convene a working party with other relevant organizations, including for example, Roads and Maritime Services, Fire and Rescue NSW and the Boating Industry Association to consider ways of further promoting community education about the dangers of carbon monoxide poisoning.

Initiatives could include,

- Developing a joint public education campaign especially targeted at recreational and leisure use of sailing and motor vessels, caravans and motor homes with potential carbon monoxide sources such as fuel burning heating and cooking appliances.

- Developing a safety pamphlet about the issue for distribution at retail outlets and marinas.

- Strengthening the safety message about this issue in all online material for those applying for a boat driving licence and elsewhere as appropriate.

Table of Contents

Introduction

1. On the evening of Friday 1 July 2016, Nicholas Banfield and his girlfriend, NL, moored in Sydney Harbour to share a meal and spend the evening on his yacht. It should have been the start to a beautiful weekend. However, on Sunday 3 July 2016, NL woke in a confused state. She did not have a clear idea of where she was but she somehow managed to telephone for help and a search for the yacht commenced. Tragically, when friends and police boarded the boat to render assistance, they found Nicholas already dead and NL in need of urgent medical attention. The tragic circumstances of his death are the subject of this inquest.

The role of the coroner and the scope of the inquest

2. The role of the coroner is to make findings as to the identity of the nominated person, and in relation to the date and place of death. The coroner is also to address issues concerning the manner and cause of the person's death.[1] In addition the coroner may make recommendations in relation to matters that have the capacity to improve public health and safety in the future.[2]

3. Section 81 (1) of the *Coroners Act* 2009 (NSW) requires that when an inquest is held, a coroner must record in writing his or her findings in relation to various aspects of the death. These are my findings in relation to the death of Nicholas Banfield.

The evidence

4. The court heard oral evidence and received extensive documentary material including witness statements, expert reports, maps and photographs.

Background

5. Nicholas Banfield was 23 years of age at the time of his death. He came from a close and loving family and had been raised in Tasmania. Nicholas was known as Nick to his many friends and to his family.

6. By all accounts, Nicholas was an intelligent, talented and experienced sailor. He had been sailing since the age of seven. Nicholas had completed the theoretical and practical components of the coxswain course. Later he completed a degree in Naval Architecture. He had experience in boat restoration, sail making and boat mechanics. Nicholas had grown up sailing and had skippered a wide variety of small and large craft. He had coached junior sailors and raced in numerous ocean competitions. Nicholas had also successfully completed a number of long voyages, including having recently sailed from Hobart to Vanuatu and back to Sydney.

[1] Section 81 *Coroners Act* 2009 (NSW)
[2] Section 82 *Coroners Act* 2009 (NSW)

7. Nicholas was known to take safety concerns extremely seriously. He was well prepared and was not known to take unnecessary risks. The vessel he was sailing at the time of this tragedy was “Aquarius”. Aquarius was an 8.4 metre long white timber vessel that had originally been purchased by Nicholas’s family. He had reconditioned the boat and had been sailing it by then for many years.

8. Nicholas commenced working at the Noakes Boat and Shipyard on 5 May 2016. The owner of the Shipyard, Sean Langman described Nicholas as intelligent and professional. He was known to have a good understanding of current safety standards within the boating industry. He had entered into the defence sector of the Noakes Group and through that work had been inducted into their systems of Job Safety Environment Analysis. He had received training in relation to working within confined space.[3]

The evening of 1 July 2016 and the discovery of the tragedy

9. After work, on 1 July 2016, Nicholas sailed Aquarius to Glebe Wharf to collect NL. They sailed towards Middle Harbour and eventually anchored on a NSW Police swing mooring near Balmoral Beach. The pair cooked and ate nachos on the LPG stove in the cabin of the vessel. They had one alcoholic drink. Later the stove appears to have been turned back on to keep the cabin warm. It was cool weather and the hatches were all sealed shut, including the entrance way to the below deck cabin area.

10. It is difficult to know exactly what happened after dinner. At some point, NL remembers her heart racing and feeling really sick and confused. The couple may have rested and then lost consciousness on the bed. It is possible they both fell in and out of consciousness for a time.

11. It was not until around lunchtime on 3 July 2016, that NL was able to regain a sufficient level of consciousness to telephone for assistance. She rang her mother, sounding confused and alarmed. She knew something was seriously wrong with Nicholas. Her parents contacted the NSW Police. Sydney Water Police immediately commenced a search, leaving their base about 12.10pm. On information they had received the police craft headed firstly towards Bantry Bay. A police helicopter, POLAIR 1 had also been deployed to attend. Ambulance Services were ready to assist. A short time later, police were able to triangulate NL’s phone and new information directed the search towards Balmoral Beach.

12. At the same time, Sean Langman had also organized two of his workers to begin searching the harbor for the boat. Mr Langman and his employees arrived at Aquarius just before the police boat which was also carrying the ambulance officers. Ambulance officers immediately commenced treatment of NL and she was taken directly to Royal North Shore Hospital. Tragically, Nicholas Banfield was already dead.

13. It appears that the search and rescue operation was swift and professional, once NL raised the alarm. All available resources on land, sea and air were promptly deployed by the NSW Police Force.

[3] Evidence of Sean Langman at inquest 9/10/17, Page 24, line 40

Cause of death

14. An autopsy was conducted on 5 July 2016 by Dr Bernard l'Ons at the Department of Forensic Medicine, Sydney[4]. Internal examination revealed no abnormalities or disease. There were no injuries or suspicious marks. Toxicological testing showed a carbon monoxide level of 60% carboxyhaemoglobin saturation.[5] This falls into what is generally accepted as the lethal range. No alcohol, common drugs of potential abuse or common therapeutic drugs were detected.

15. A pharmacology report later provided by Dr Shuang Fu confirmed that Nicholas Banfield's death was as a result of carbon monoxide poisoning, caused by the incomplete combustion from the burner in a sealed cabin.[6]

16. It is significant that NL also suffered serious complications related to carbon monoxide exposure.

The expert evidence

17. It is frustratingly difficult to ascertain, with any level of certainty, how many people die each year in Australia from accidental carbon monoxide poisoning. Some cases that come before the court are clearly planned suicides, another category of deaths are plainly accidental. Nicholas's death falls into the accidental group. Unfortunately the lack of reliable data coding of deaths dealt with by all Australian coroners means that it is difficult to be certain of the true number and it is generally believed to be an under-reported phenomena.[7] Estimates from other countries are difficult to compare. However, one estimate suggests that 400 Americans die each year from exposure to carbon monoxide.[8]

18. The court heard that between 2011 and 2016 there were 15 deaths reported across Australia that are clearly attributed to using gas and solid fuel appliances in confined spaces such as caravans without adequate ventilation.[9] A further larger group of deaths from carbon monoxide poisoning occurred within the home, including cabins. Another category of carbon monoxide deaths occur in silos or enclosed work environments. It is also clear that there are significantly greater numbers of injuries and health problems related to "near miss" poisoning incidents.

19. While it is difficult to be certain of the number of annual deaths caused by accidental exposure to carbon monoxide, it is clear that there is a large potential risk in the leisure industry. Gas appliances are commonly installed in recreational vehicles, boats and caravans. Gas is often used to fuel cooking appliances, water heaters and refrigerator units. Risk exists whenever appliances are not installed properly, or are faulty or if they are used without proper ventilation.[10] Given the confined space of leisure vehicles and craft, the risk appears higher than when such appliances are used in a house or open area. The problem is

[4] Exhibit 1, Tab 4, Report of Dr B l'Ons
[5] Exhibit 1, Tab 6, Certificate of Analysis
[6] Rort of Dr Fu, Exhibit 2
[7] Evidence of Dr Ciaran MacCarron at inquest, Transcript 9/10/17, page 17, line 45 onwards
[8] Report of Dr Ciaran MacCarron, Exhibit 1, Tab 8, page 7
[9] See NCIS data summary, Exhibit 1, Tab 14
[10] For discussion of the mechanism of CO poisoning and other issues, see "The risk of carbon monoxide poisoning from domestic gas appliances" Exhibit 1, Tab 16

exacerbated as carbon monoxide is invisible, odourless and tasteless. It is known to cause significant health problems at very low atmospheric concentrations and can cause death within minutes if levels rise quickly.

20. It became clear during the course of the inquest that the potential danger of carbon monoxide poisoning is somewhat unknown or under-estimated in the recreational boating field.[11] There is no requirement for carbon monoxide alarms in cabins and clear warning stickers attached to appliances are not mandatory.

The Fire and Rescue NSW re-enactment

21. The Fire Investigation & Research Unit (FI&RU), of Fire and Rescue NSW was asked to assist the NSW Police Marine Command to complete "a re-enactment of the circumstances of this incident regarding the burning of gas to determine how long it would have taken for levels of carbon monoxide to build to a level that would be commensurate with the levels detected in the deceased's blood."[12] The test took place on the Aquarius, using the stove and simulating conditions on the evening.

22. Testing was conducted using two methods[13]. It was immediately clear that carbon monoxide levels can become quickly elevated to dangerous levels when using an LPG cooker in an enclosed yacht cabin. As the report makes clear it is likely that that Nicholas and NL felt increasingly light headed, dizzy, nauseous and fatigued as the levels began to rise. This would have impeded their capacity to reason and problem solve. On FI&RU calculations the carboxyhaemoglobin concentration (%COHb) would have reached 30% after 98 minutes and 60% after 152 minutes. According to evidence presented to the court, a "moderate" level of saturation (calculated at 21-40 %) could cause severe headache, fatigue and lethargy, confusion, dizziness and a range of other symptoms.[14] Of course individuals will process exposure in different ways. It will depend on a number of factors including body size, fitness and level of activity. Those with compromised cardiac function will be at greatest risk of death.

23. The Aquarius, like most boats of its kind did not have a functioning carbon monoxide alarm. It is important to note that during testing the carbon monoxide alarm that the FI&RU used in testing sounded after 4 minutes. Given the likely build-up of gas it is probable that Nicholas Banfield died some time before he was discovered. On the other hand it is very difficult to know how NL survived.

24. As a result of FI&RU testing, the officer in charge of the police investigation made a number of recommendations to the court including support for the mandatory installation of carbon monoxide detectors, better signage in relation to the use of gas appliances in confined spaces and further community education.

[11] See for example the evidence of Detective Michael O'Keefe, Marine Area Command, Transcript 9/10/17 at page 8 onwards.
[12] FI&RU report, Exhibit 1, Tab 7, page 1
[13] FI&RU report, Exhibit 1, Tab 7, page 2 onwards
[14] The Allen Consulting Group Report "The risk of carbon monoxide poisoning from domestic appliances"

The evidence of Dr Ciaran MacCarron

25. The court also obtained the expert advice of Dr Ciaran MacCarron, an occupational health and safety consultant with a particular research specialty in confined space fatalities. Dr MacCarron compared the regulatory environment of a work place with what occurs in the leisure industry. He expressed a strong concern that in leisure environments, people are not trained to expect the level of risk that may be involved in their activities. Without the kind of regulation that exists in work place safety regimes, tragedies will occur.

26. Dr MacCarron supported the introduction of carbon monoxide alarms in the leisure industry. He expressed the importance of creating appropriate standards, taking into account the important issues of reliability and cost. He was also of the view that increasing the knowledge base of the general public in relation to the risks associated with oxygen deficiency and gasses was important and felt that a public education campaign aimed at boat and caravan users was warranted. He suggested that any training for a "skipper's ticket" could include further emphasis on carbon monoxide poisoning. He stated that increased use of warning stickers and notices could also be usefully considered.

27. Dr MacCarron brought the court's attention to legislative change in Minnesota in the United States of America which occurred in 2016, after the death of a seven year old child on her family's boat on Lake Minnetonka. Known as "Sophia's Law" after the child who died, the state of Minnesota has introduced mandatory hard-wired, marine certified carbon monoxide detectors in boats with enclosed cabins. It has been reported as the first state in the USA to have introduced such regulatory change. The tragic story of Sophia has apparently prompted some public attention to the issue in Minnesota and helped provide a focal point for community education. I am aware that Nicholas Banfield's family have generously indicated that they would support a similar initiative in this country, if it could save other families from the tragedy they have suffered.

Support from the boating industry

28. Sean Langman, Nicholas's employer gave evidence at the inquest. Mr Langman is the managing Director of Noakes Group Pty Ltd. He has been in the maritime industry for 35 years. His company is the largest employer of recreational boat repairers in NSW, employing over 100 people[15]. Mr Langman's participation in the inquest was extremely useful to the court in that he could offer practical and realistic evidence from the boating industry perspective. He is to be commended for the positive approach he took to these proceedings.

29. The shock of Nicholas's death caused Mr Langman to carefully review common practise in his industry in the hope of finding ways to prevent future tragedy. Mr Langman was of the view that the fitting of alarms or detectors was an achievable and practical goal. However, without legislation, he was finding it difficult to persuade recreational boat owners to fit carbon monoxide detectors or alarms and to have them regularly calibrated and checked. He told the inquest that his company could see 3,500 boats a year and that since Nicholas's death each had been requested to fit a detector. Unfortunately, by the time of the inquest only two had decided to do it. Since the inquest, Mr Langman has made a large financial commitment to the project and made it known that he is prepared to fit the alarms at reduced

[15] Evidence of Sean Langman at inquest 9/10/17, Page 23, line 24

cost in order to encourage a greater take-up rate. He has stated that it will be compulsory for his customers to install an alarm. He had also reached out to other companies to consider doing the same. Nevertheless, he was of the view that, in the long term, only legislative change would be likely to force the issue with all boat owners.

30. Mr Langman told the court that there are currently a number of different detectors available at varying costs and quality. Like Dr MacCarron he supported a need to develop and standardise the type of device which would be suitable in the leisure industry, if legislation were to mandate installation. He stressed the need to involve the Boating Industry Association to help ensure compliance.[16]

31. After the oral evidence had been completed, the Court was also informed that Howard Glen, the CEO of the Boating Industry Association was keen to become involved in a targeted educational campaign with boat owners about the risk of carbon monoxide poisoning and had already been involved in talks with the RMS.

The need for recommendations

32. Nicholas Banfield was an intelligent and careful sailor with many years of experience. That such a tragedy can befall him, in itself calls for a re-thinking of the regulation of this environment. The fact is he is not an isolated figure. Detective Michael O'Keefe, who was involved in the investigation of this matter and is attached to the Police Marine Area Command and a recreational boat owner himself, told the court that prior to this tragedy he was "largely unaware of the dangers of carbon monoxide" even though he had a stove in his own yacht[17]. Sean Langman, with 35 years of experience in the boating industry also saw the need for greater public awareness.

33. The FI&RU testing of the stove on the Aquarius demonstrated that an appropriate and functioning alarm would have saved Nicholas's life and prevented ongoing injury to NL. In my view, there is an urgent need for reform and I have been heartened by the attitude of the boating industry and the RMS to get behind targeted education and change.

Findings

34. The findings I make under section 81(1) of the Act are:

Identity
The person who died was Nicholas Banfield.

Date of death
He died between 1 July 2016 and 3 July 2016.

Place of death
He died on board the Aquarius, which was moored at Balmoral Beach, Sydney.

[16] Evidence of Sean Langman at inquest 9/10/17, Page 27, line 45 onwards
[17] Evidence of Detective O'Keefe, Transcript 9/10/17, Page 8, line 30 onwards

Cause of death

He died of carbon monoxide poisoning.

Manner of death

His death was accidental.

Recommendations

35. For reasons previously stated I make the following recommendations pursuant to section 82 *Coroners Act* 2009 (NSW)

To the Minister for Roads, Maritime and Freight

I recommend,

Urgent consideration of the introduction of legislation to mandate carbon monoxide alarms in all recreational and leisure craft and vehicles with sealable cabins, including sailing and motor vessels, caravans and motor homes, that have potential carbon monoxide sources such as fuel burning heating and cooking appliances. These alarms should conform to an appropriately developed minimum standard. Consideration should also be given to the introduction of other compulsory safety mechanisms such as prominent warning stickers. Any system introduced should include provision for checking and enforcement.

To Transport for NSW (TfNSW)

I recommend,

That Transport for NSW convene a working party with other relevant organizations, including for example, Roads and Maritime Services, Fire and Rescue NSW and the Boating Industry Association to consider ways of further promoting community education about the dangers of carbon monoxide poisoning.

Initiatives could include,

- Developing a joint public education campaign especially targeted at recreational and leisure use of sailing and motor vessels, caravans and motor homes with potential carbon monoxide sources such as fuel burning heating and cooking appliances.

- Developing a safety pamphlet about the issue for distribution at retail outlets and marinas.

- Strengthening the safety message about this issue in all online material for those applying for a boat driving licence and elsewhere as appropriate.

Conclusion

36. Finally I thank all those who participated in this inquest for their co-operative approach. I commend Mr Langman for the leadership he and his company have shown in relation to this issue. I commend the RMS for their co-operation and support of comprehensive safety recommendations.

37. Once again I offer my sincere and heartfelt condolences to Nicholas's parents and I acknowledge their ongoing grief and pain. I thank them for travelling to Sydney for this inquest and for their brave participation in the task of trying to find safety solutions for the problems that have been identified in this process. I sincerely hope that the terrible tragedy of their son's death brings legislative change and increased education in relation to the potential dangers of carbon monoxide poisoning in the boating and leisure industry.

38. I close this inquest.

Magistrate Harriet Grahame
Deputy State Coroner
4 December 2017
NSW State Coroner's Court, Glebe