QUEENSLAND COURTS

OFFICE OF THE STATE CORONER

FINDINGS OF INQUEST

CITATION:	**Inquest into the death of H, a child**
TITLE OF COURT:	Coroners Court
JURISDICTION:	Brisbane
FILE NO(s):	2012/3338
DELIVERED ON:	26 September 2014
DELIVERED AT:	Brisbane
HEARING DATE(s):	20 May 2014, 6-8 & 11-12 August 2014
FINDINGS OF:	John Lock, Deputy State Coroner
CATCHWORDS:	Coroners: inquest, quad bike accident, roll over, children, supervision, helmets

REPRESENTATION:

Counsel Assisting: Mr P. De Waard, Office of State Coroner

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Workplace Health & Safety Queensland:
Mr K Parrott of Counsel I/B Crown Law

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Introduction

Approximately 170 deaths over the past decade have occurred in Australia and New Zealand where Quad Bikes were involved. Most of these have occurred in a rural setting and the leading cause of death on farms in Queensland has some involvement with a quad bike.[1]

It is uncontroversial to say that a number of the statistical sources confirm that the majority of deaths occurred in the age group of 10 – 19 and a second highest age group for those over the age of 50.

Quad Bikes are essentially four wheeled motorbikes. They are motorised vehicles designed to travel on four low-pressure tires, having a seat designed to be straddled by the operator, and handlebars for steering control. They are used for both recreational purposes, either privately or in tourism, or for agricultural purposes. In Australia and New Zealand they are typically used in rural settings. They are utilised by search and rescue teams. In the United States of America they are also used in rural settings but the majority are used in a recreational setting.

Whatever may be said about their utility, they have become essential equipment on many farms. That being said, the evidence gathered during this multiple inquest raise many issues including the importance of active riding, good maintenance, use of correct tyre pressure, use of helmets, not allowing children to ride adult sized quad bikes, understanding the limitations of the vehicle and that tragic incidents can occur in quite benign conditions. The cases also emphasise the importance of riders making appropriate decisions.

Most standard quad bikes have no roll over protection system (ROPS). In broad terms, a ROPS is a cabin or roll bar structure on top of the quad bike, which incorporates a seatbelt to restrict movement outside the protective zone in the event of a roll over. Other possible protection mechanisms include Crush Protection Devices (CPD), which is a two bar or circular structure attached to the rear of the vehicle, which aims to provide a protective space in the event of a roll over, but without a seat belt. The utility of either device has been the subject of considerable debate.

Quad Bikes are referred to by the manufacturers and marketed to the public as 'All Terrain Vehicles' (ATVs). There has been some criticism of the use of that term.[2] In this inquest it is intended to adopt the term Quad Bike, but I do so conscious of both arguments and simply use the term in this phase of the inquest because it is one known better to the general public in Australia.

There has been considerable research, studies, reports and investigations carried out by varying persons and organisations considering how to reduce the number of quad bike related accidents. Although there is considerable agreement in relation to a number of issues, there has been robust debate between the main protagonists and considerable difficulty in reaching a consensus as to how to move forward on some of the more contentious issues.

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[1] Lisa Crockett, *National Coronial Information System Database Search.* The report was dated up to 1 January 2013 and noted there is a possibility of underreporting due to filing errors and currently open investigations. The deaths involved in this inquest would not be included. By the time of the inquest the figures estimated were closer to 195.

[2] Coroner John Olle, *Record of Investigation into Death of Thomas John Hutchings* (2009) State Coroner Victoria, case number 3067/02, p 4. Coroner HB Shortland, *An inquiry into the death of Carlos Mendoza,* Coroners Court New Zealand, CSU- 2010-WHG- 000185 at p 25

This inquest will examine the circumstances of the deaths of nine individuals. Findings in relation to each of those cases will be made in the first phase of this inquest. In the second phase I will hear evidence concerning what recommendations should be made to help prevent deaths occurring in similar circumstances in future.

The evidence

1. The tragic circumstances of this fatality involve a child and a related family member. For the purpose of protecting the family from as much further distress as was possible in the circumstances, on 20 May 2014 I made a non-publication order prohibiting the publication of the name of the deceased person, and any information that identifies or is likely to identify them.

2. H died due to crush injuries as a result of rolling an adult sized quad bike at approximately 9:00am on 15 September 2012. The incident occurred on a dirt road into his home on a private rural property in Queensland. H was 11 years of age at the time of his death. The quad bike belonged to the family.

3. H had been living at the 80ha property with his mother, stepfather and 15 year old brother for the last few years. After school and on Saturdays, H used to assist a neighbour on their dairy farm that had been recently purchased from his stepfather. His neighbour's property was about 800 metres away. He would commence his work days in the very early hours of the morning.

4. There was varying evidence as to whether H was paid for his work at the dairy farm. His employer advised police that there was no formal pay arrangement but he had been previously given a calf. His father advised police that H was paid for his work. This matter was not reported by the police to Workplace Health and Safety Queensland (WHSQ) as it was treated more as a children protection services issue rather than a workplace issue. I accept that this was an informal arrangement between neighbours and had little to do with an employment relationship.

5. At about 3:50am on the morning of 15 September 2012, H departed to the neighbour's dairy farm on his quad bike. After helping to milk the cows, H returned on the quad bike to his house at about 9:00am. His mother and stepfather were not at home at the time.

6. Shortly after 9:00am, H's 15 year old brother, C, was inside the house when he heard the noise of the quad bike returning along the driveway before the engine went quite. He did not hear H come inside so about five minutes later he went outside to investigate. He found H underneath the quad bike. He was lying on his stomach, face down, with his arms out in front of him. The quad bike was rolled onto its side, with the right foot rest across H's back.

7. As he approached H, he noticed his arms were not moving much and he was starting to turn purple (specifically around his ears). He seemed drowsy and his

face was ‘slopey’. C attempted to lift the quad bike off H but it was too heavy. The curb weight of the quad bike was 365kg.

8. C told H he would go and get the neighbours from the dairy farm, to which H replied ‘righto’ in a soft whisper.

9. C drove a Hilux utility vehicle to the neighbour’s dairy farm seeking help. Prior to leaving, he looked at his brother, who appeared to be unconscious. He called out to his brother, but did not receive a response. One neighbour travelled with C back in the utility and another on a quad bike back to the house. By that time, H was not breathing; he had no pulse, and was blue in the face. The neighbour pulled the quad bike off him.

10. C phoned an ambulance on the landline at 9:02am and the neighbour commenced CPR on H.

11. Sergeant Kidd, Officer in Charge of Goombungee Police Station, was the first to arrive at the scene and took over CPR. The Queensland Ambulance Service arrived at about 9:17am. After all attempts had been made to revive H, a Life Extinct certificate was issued by a paramedic at 9:50am.

Autopsy results

12. An external and internal post mortem examination was undertaken by a forensic pathologist, Dr Boris Terry, at the Toowoomba Mortuary on 18 September 2012. Toxicology tests were also undertaken. Dr Terry completed his autopsy report on 12 November 2012.

13. Dr Terry found that there were petechial haemorrhages over the surfaces of the lungs, which are commonly seen following death due to asphyxia. There was minor bruising over the chest and no evidence of major internal injury.

14. Dr Terry found that neither drugs nor alcohol contributed to the death. He also noted a clinical history of intellectual impairment.

15. Dr Terry concluded that H’s death occurred due to restriction of chest movement caused by the weight of the quad bike on top of him. The medical cause of death was due to: *asphyxia*.

The investigation

16. Police commenced their investigation on the morning of the incident. They interviewed relevant witnesses and conducted an inspection of the deceased’s body. Scenes of crime officers photographed the incident location, the deceased child, and the quad bike in situ.

17. A Forensic Crash Investigator, Senior Constable Jonathan Reid, attended the scene at 11:45am and inspected the quad bike and seized it for mechanical inspection. He examined the scene for track marks to attempt to reconstruct

events that had resulted in the quad bike overturning. However, the dirt track was extensively contaminated by emergency services prior to police arrival.

18. The initial police reporting officer, Sergeant Gregory Kidd, submitted a Form 1 dated 15 September 2012. Senior Constable Reid submitted his FCU police report on 1 January 2013 and obtained further information in the lead up to the inquest at the direction of the Coroner. He provided oral evidence at the inquest.

19. Senior Constable Reid owned a quad bike himself and had a good understanding of them. However, he agreed that quad bike specific investigation training and a standardized template for quad bike investigations would be useful.

20. Senior Constable Jonathan Reid was of the opinion that H lost control of the quad bike when travelling on the road towards his house, causing the quad bike to roll over, and H to be ejected from the quad bike in the process.

21. In oral evidence, different possibilities were discussed with Senior Constable Reid as to how this would have occurred. The most likely appears to be that whilst travelling in a straight line, H turned sharply to the left to go around a bend. There was a rock in the centre of the driveway that he would have ridden over and he would then have ridden over a slight rise of the grassed verge area to the left of the road. H is unlikely to have effectively shifted his weight to the left of the quad bike and the quad bike has rolled to the right.

22. Senior Constable Reid was of the opinion that the quad bike rolled 1¼ times in a clockwise direction. However, it was suggested that it was also possible that the quad bike only rolled ¼ of a time. Due to the large number of emergency vehicles, civilian vehicles and pedestrian traffic over the area, Senior Constable Reid was unable to identify with certainty any tracks left by the quad bike. He based his opinion on his observations of the scene, the damage sustained to the quad bike and the injuries sustained by H.

23. Approximately two metres directly to the north of where H had come to rest, Senior Constable Reid located a fresh divot or gouge mark, which appeared to have been caused by the quad bike rolling over. Continuing towards H, was a small debris field of tools and irrigation items, the left handlebar mirror, and the left knuckle protector from the handlebar. An inspection of the mounting screw of the mirror showed a fresh fracture of the metal, indicating it had been snapped off as the quad bike rolled. He also noted that the left handlebar had been bent slightly downwards. The mark on H's back was measured and noted to have matched the right foot rest of the quad bike. This supported a conclusion that the right foot rest of the quad bike had landed on top of H.

Quad bike details

24. The quad bike was a 2002 model Taiwan Golden Bee 'Blade' 460cc and had been purchased new from a local dealer by H's stepfather. This is a quad bike manufactured in China. TGB is not a member of the FCAI and was not bound by the US Standard in place at the time.

25. The quad bike had a small after-market tool box attached to the front gear rack. This was the only accessory fitted and had only a small number of irrigation and general farming tools within it. In Senior Constable Reid's opinion, the weight of the tools and the tool box would have had no bearing on the handling of the quad bike.

26. There was no CPD or ROPS installed on the quad bike.

Mechanical inspection

27. On 26 September 2012, Mr Simon Major from the Queensland Police Vehicle Inspection Unit at Alderley, Brisbane, conducted a mechanical inspection and test rode the quad bike. He finalised his report on 28 September 2012.

28. He found that all throttle components were connected and operating freely. The brakes all functioned satisfactorily. However, the park brake had only very minimal retardation and was potentially dangerous.

29. The suspension components were connected and operational. The electrical system operated satisfactorily.

30. Mr Major was of the opinion that there were no mechanical defects that would affect the road going capabilities of the quad bike.

31. The TGB Owner's Manual that was supplied with the quad bike upon purchase was provided by H's stepfather to the police. It was stated in one section of the manual that the mandatory tyre pressure for the 460cc model 'off road' was 5 psi and for 'on road' it was 10 psi. 'Off road' and 'on road' were not defined. In another section of the manual, it stated that the cold tyre pressure was 3 psi.

32. Mr Major noted in his report that the tyres were inflated and of satisfactory thread depth. He did not initially provide the tyre pressure measurements that he had taken during his inspection. They were later obtained by the Coroner and it was revealed that the tyre pressures were as follows:

a. Front left – 12 psi;
b. Front right – 11psi;
c. Rear left – 8 psi; and
d. Rear right – 9 psi.

33. What this demonstrates is that each of the tyres was at a different pressure. This could have potentially affected the handling characteristics of the quad bike. It also demonstrates that if the dirt road on H's property was considered 'off road', the tyres on the TGB were inflated about 2-3 times the manufacturer's recommendations. The manual warns that since the tyre pressure influences the driving ability, the mandatory tyre pressure should always be maintained.

Terrain and conditions

34. The dirt driveway to the house was approximately 150m in length. The driveway's width accommodated a single vehicle travelling in one direction but had slightly raised grass verges on either side. It was bordered by temporary electric fencing comprising of star pickets and two strands of white electric 'hot tape'.

35. Senior Constable Reid noted that the driveway surface was not level, and several rocks and bumps were prevalent in the surface.

36. There were a pile of rocks close to the incident scene. The assumption was made by H's brother that H may have collided with this pile, causing the quad bike to roll over. Senior Constable Reid inspected the pile of rocks closely and noted they had not been disturbed in any way. They were also in the wrong position to have been involved in the incident. He therefore discounted this as having contributed to the incident.

37. No measurements were taken of the smaller rocks imbedded in the driveway. Nor were any measurements taken of the distance between the rocks indented in the driveway and the approximate location of H.

38. No measurements were taken of the angle of the turn of the quad bike due to contamination of the scene and the unavailability of mapping equipment. No defined tyre marks could be found to show the direction of travel of the quad bike prior to the incident, although photos of the scene did show potential tyre marks, which could not be discounted.

39. Bureau of Meteorology data suggests that there was no rainfall recorded on the day of the incident. The temperature at 9:00am was 16.6 degrees and the sun rose at 5:46am.

40. There is no evidence to suggest that there were any visibility issues at the time of the incident.

Speed

41. Senior Constable Reid was unable to establish the speed the quad bike was travelling or the manner in which it was being ridden at the time of the incident.

H was under 16 years of age and riding an adult sized quad bike

42. The quad bike had a large warning sticker located on the front right wheel guard, in clear view of the rider, stating: 'WARNING – Operating this ATV if you're under the age of 16 increases your chance of injury or death. NEVER operate this ATV if you're under the age of 16'. The owner's manual also provided clear warnings that children under 16 years must not ride the quad bike.

43. Although H was a strong and healthy child, his physical capability would not have been matched by his cognitive capacity, maturity, judgement and perception. There is no doubt that this would have contributed to the incident.

44. H's stepfather described him to police as very mechanically minded and a practical kid who was handier around the farm and house than most adults.

45. However, H also had an intellectual learning disability. He was in year six at school but he was completing school work at the level of a year four student. H's paediatrician in Toowoomba, Dr Don Adsett, advised the Coroner in a letter dated 27 May 2014 that H's condition placed him in the second percentile. He had a moderately severe disability that would not have necessarily limited his gross motor skills. Hence, he would have been capable of riding a quad bike. Dr Adsett did however note that H's degree of impulsivity and emotional disregulation may have limited his ability to drive safely.

Issue of supervision

46. H's mother and stepfather advised police that they had rules regarding the boys riding the quad bikes. She said that the boys were both required to wear helmets and they were not allowed to ride the quad bikes recreationally. They were only allowed to ride in second gear on the smaller Honda quad bike and no faster than 15km/h on the larger TGB quad bike.

47. H's stepfather advised police that the boys were not allowed to go past second gear on the TGB quad bike, which would restrict their speed to about 12km/h. That was unless, his mother or stepfather was with them and they were pillion passengers.

48. H's brother was interviewed by police. He stated that he and H did quad bike racing on a track they had built on the property. H's brother said they were always required to wear a helmet but did not mention anything about having speed limits. I did not direct further questioning by the police to clarify matters with H's brother due to a concern that further contact would be detrimental to his wellbeing.

49. In the lead up to the inquest, police contacted H's step ather about a range of issues. H's stepfather advised police that there was no designated or built quad bike track on the property and that if the boys were riding recreationally, it would have been in one of the paddocks. At the time of the inquest, they no longer lived at the property.

50. It is noted that the TGB quad bike was an automatic, whereas the smaller Honda quad bike was a manual. Therefore, H's stepfather's rule about not going past second gear in the TGB is difficult to understand. It would also appear that their rule regarding no recreational use was not followed. It is unclear whether H's brother was aware of any speed limits.

51. Although H was only riding a short distance to and from his neighbour's property of about 800m, it must be noted that this was in the absence of any adult supervision.

Personal Protective Equipment

52. H's helmet was compliant with Australian standards, was a size 'small', and was specifically purchased for both boys. H's mother said that the helmet fitted him really well. He knew he had to have the helmet strapped up and he always did when riding quad bikes.

53. Although the helmet was near H when he was discovered, it is Senior Constable Reid's firm opinion that H was wearing his helmet at the time of the incident. It would appear that H removed his helmet prior to being discovered by his brother.

54. The autopsy report states that H had a 12mm graze over his left lateral forehead. Senior Constable Reid's opinion is that it is likely that the graze would have been sustained by the solid internal shell of the helmet, which would have been in contact with H's forehead as he fell to the ground. He has suggested that if the helmet had not been worn, it would have been located further from him and the quad bike as it fell from the quad bike after rolling.

55. It is Senior Constable Reid's opinion that had the helmet not been worn at the time of the incident, H would have sustained more significant injuries to his face and head as he struck the ground.

56. The TGB Owner's Manual states that before operating the vehicle, an approved safety helmet, boots, goggles, gloves and full protective clothing must be worn.

57. H was wearing his older brother's gumboots, which were several sizes too large for him, tracksuit pants and a t-shirt.

Training

58. H's stepfather had been involved in farming all his life. His first experience with quad bikes was in the early 1980s when the three wheeler motorcycles were introduced as a farming tool. Over the years he has used motor cycles, three wheelers and quad bikes extensively on farms he has worked at and operated.

59. H's stepfather had not received any formal training. However, he felt that his extensive use had given him a large amount of experience and he noted that he had never had a serious incident on a quad bike.

60. H's stepfather passed on his knowledge to the children. He says that he instructed the children and closely observed them during mustering and any farm work that was conducted until the point where he believed they were both competent operators. At the time of the incident, he says he still monitored the riding habits of his children and gave them instructions where appropriate.

61. H's stepfather advised police that he had read the TGB owner's manual but not in its entirety. He was unsure if his wife had read the manual but he did not think she had.

62. It is noted that the TGB owner's manual was inconsistent in parts and may not have made a lot of sense in key areas to a person new to quad bikes.

63. H had been riding quad bikes since between five and eight years of age. He had also been driving a tractor and riding horses for some time. H's mother and stepfather felt that he was a competent quad bike rider. H's neighbour who employed him at the dairy farm also felt he was a competent and sensible rider.

64. H usually rode a much smaller 2006 model Honda TRX 250cc quad bike. On the evening prior to his death, H's stepfather informed him that his usual Honda quad bike was broken and he would need to use the larger TGB quad bike. The larger TGB quad bike had only been purchased by his stepfather six months earlier. His stepfather said H would have ridden it 20 times or more.

65. It is important to note that the Honda quad bike that H was more used to riding would have been much lighter than the TGB quad bike, with a lower centre of gravity, and about half the size in terms of power (250cc compared to 450cc). It would have also handled quite differently when you consider the difference in the proportion of H's size to the quad bike. Photographs of the Honda quad bike also indicated that the front tyres were relatively bald compared to the more aggressive 'all terrain' tread of the tyres on the larger TGB quad bike. This would have made it easier for H to take corners relatively sharply and achieve the front end of the quad bike to 'slide' at low speeds, if he was inclined to do so.

66. Therefore, if H had attempted to take the left corner of the drive way relatively sharply on the TGB quad bike, it could have handled very differently and is likely to have resulted in the tyres digging in and causing the roll over that occurred in this incident.

67. H would have been familiar with the area of the driveway on which the incident occurred as he had been living there for some time and used to ride his quad bike along the same driveway frequently.

68. For all quad bikes, it is important that riders incorporate what is known as 'active riding'. Because of the effect of centrifugal force and inertia force, a rider needs to change their body's centre of gravity to avoid rolling the quad bike or skidding. The heavier the rider, the more effective this is. H weighed 72kg, so active riding is likely to have made a difference.

69. While making a left turn, it would have been important for H to slow down and incline his body to the left to change the centre of gravity. This was explained in the TGB owner's manual. It is unlikely that H would have had a full appreciation of these skills, despite his experience. The consequences of not incorporating active riding on a heavier and faster quad bike are much greater. Failure to do so in this case could have resulted in the quad bike rolling to the right.

Conclusions

70. H died from crush injuries when the adult sized quad bike he was riding rolled over on him in relatively benign terrain. It is unclear how that occurred. Approach speed is unknown. Whether the quad bike rolled ¼ or 1¼ times is not able to be ascertained as a probability, although I find it difficult to conceive the latter figure. The damage to the left mirror contradicts this. I am not sure it is important to make a finding.

71. What is known is that H was riding an adult sized quad bike and that was clearly against the instructions of the manufacturer. H was not as used to this quad bike as he was more experienced on a smaller, albeit still an adult sized quad. It had some differences in relation to weight, power and different treads of tyres. It handled differently.

72. Whatever may have been H's relative experience and competencies on a quad bike, this is an example of why the overwhelming evidence from virtually all safety experts and industry is that children under 16 should not ride adult sized quad bikes, and certainly not when unsupervised.

Findings required by s. 45

My formal s. 45 Findings will be included in the findings forwarded to family.

Comments and recommendations

I close the inquest in respect to my findings as required by s. 45. I will be considering any comments and recommendations in the second phase of this multiple inquest.

John Lock
Deputy State Coroner
Brisbane
26 September 2014