FINDINGS, COMMENTS AND RECOMMENDATIONS of Coroner Olivia McTaggart following the holding of an inquest under the *Coroners Act* 1995 into the death of:

TODD ANDREW CARVER

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Record of Investigation into Death (With Inquest)

Coroners Act 1995
Coroners Rules 2006
Rule 11

I, Olivia McTaggart, Coroner, having investigated the death of Todd Andrew Carver, with an inquest held at Hobart in Tasmania, make the following findings.

Hearing dates

16-18 December 2020 and 18 February 2021.

Appearances

Counsel Assisting: S Nicholson
Counsel for West Coast Transport Pty Ltd as trustee of the West Coast Transport Unit Trust trading as De Bruyn's Transport ("De Bruyn's"): K Read SC
Counsel for Hendrickson (Asia Pacific Pty Ltd) Trucks ("Hendrickson"): S Knight
Counsel for Fiona Carver: A Kendall

Introduction

1. Todd Andrew Carver, aged 42 years, died in the course of his employment as a truck driver for De Bruyn's Transport. On 13 July 2014 he was driving a prime mover and laden fish tanker (together called "the vehicle") northbound on Esperance Coast Road when the vehicle suffered a rollover, leaving the road on the opposite side and travelling over a steep embankment.

2. The coronial investigation was finalised on 8 October 2015, when Coroner Stephen Carey handed down his findings without holding a public inquest. Coroner Carey's finding is attached to this finding. Coroner Carey determined that the cause of the crash was the effect of the speed of the vehicle exceeding the rollover threshold for the stretch of road in question. He determined that Mr Carver died of asphyxia when he became trapped in the cabin of the prime mover after the rollover.

3. On 5 February 2018, more than two years after Coroner Carey's finding, one Dr Arnold McLean, engineer, wrote to Coroner Carey (then retired) seeking the re-opening of the investigation. Dr McLean asserted in his letter that there was a safety issue with air suspension

systems of the type fitted to the prime mover driven by Mr Carver and this issue caused or contributed to the rollover and Mr Carver's death.

4. Dr McLean described that, just before the rollover, Mr Carver had operated the vehicle in low gear and with high torque without braking, and in that state, the air suspension exhibited the phenomenon of "frame rise" which meant that the pressure in the air spring was "void" and therefore the suspension would have had minimal roll resistance. With reduced roll resistance, the vehicle entered into a rollover on the curve in question.

5. Upon receipt of Dr McLean's correspondence, I obtained, as delegate of the Chief Magistrate under the *Coroners Act* 1995 ("the Act"), the completed investigation file.

6. Upon reviewing the evidence upon which Coroner Carey based his findings, it was apparent that Dr McLean had not provided evidence in the original investigation nor had the issue raised by him been considered. It was unclear to me at that time how Dr McLean came to be in possession of considerable investigative information about the circumstances of the rollover so as to form his opinion.

7. It was also apparent that Mr Carver died as a result of an accident or injury that occurred at his place of work and his death was not due to natural causes.[1] In such a case, a public inquest is mandatory – except if the senior next of kin (as defined in the Act) requests the coroner not to hold an inquest *and* the coroner is satisfied that it would not be contrary to the public interest or the interest of justice if the inquest was not held.[2]

8. Mr Carver's senior next of kin is his wife, Mrs Fiona Carver. Unfortunately, in the original investigation, Mrs Carver was not sent written notification as required by section 26A of the Act that a decision had been made to hold an inquest and the reasons for that decision. Having not received such notification, she did not appreciate that an inquest was mandatory. It is only upon receipt of such written notice by the senior next of kin that the coroner may dispense with the holding of a public inquest under that section. I am satisfied that Mrs Carver would not have provided written notice requesting the coroner *not* to hold an inquest.

9. Coroner Carey then finalised the investigation with an in-chambers finding, overlooking the requirement to hold an inquest or to write to Mrs Carver as required by the Act.

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[1] Sections 24(1)(ea) and 26A, *Coroners Act 1995* (Tas).
[2] Section 26A.

10. When Mrs Carver was advised of the receipt of Dr McLean's request to re-open the investigation, Mrs Carver also indicated that she sought re-opening on the basis that she had concerns about Mr Carver's experience in driving heavy combination vehicles with liquid loads as well as concerns about De Bruyn's standard of vehicle maintenance.

11. On 1 October 2018, after hearing from the interested parties, I made an order as the Delegate of the Chief Magistrate under the Act that the investigation be re-opened and the findings be re-examined by myself on the basis that the investigation was compromised by procedural irregularity and also that facts or evidence affecting the findings had come to light.[3]

12. Given the requirements of section 26A, I determined that a public inquest should be held, with the following issues to be examined:

    a) The factual circumstances of the crash;

    b) Causation for the crash, including whether the issue postulated by Dr Arnold McLean (regarding the vehicle having minimal roll resistance at the time of the crash due to particular characteristics of its air suspension) is relevant to causation; and

    c) An examination of the adequacy of Mr Carver's training in operating the vehicles provided in the course of his employment with De Bruyn's.

13. For the following reasons I find, as did Coroner Carey, that the cause of the rollover was that the vehicle driven by Mr Carver exceeded the rollover speed for the road. I find that there was no defect, fault or safety issue associated with the air suspension system on the prime mover as postulated by Dr McLean that contributed to the rollover. For the following reasons, I find that there were aspects of the training of Mr Carver that required improvement, although I cannot find as a fact that these training issues contributed to his death.

Evidence considered in the re-opening and re-investigation

14. The evidence to which Coroner Carey had regard in the original investigation is attached to this finding.

15. Also attached is the exhibit list of the documentary evidence to which I have had regard in the re-opened investigation. The additional documentary exhibits (over and above the original documentary exhibits) comprised documents regarding the air suspension system on the prime

[3] Section 58(1)(b) and (d).

mover; documents from De Bruyn's regarding induction, training and safety procedures; documents authored by Dr McLean; affidavits of De Bruyn's management personnel; reports from two crash analysis experts, John Ruller and Shane Richardson, regarding the rollover and suspension; driving records for Mr Carver; and an additional affidavit of Mrs Carver.

16. The oral testimony at inquest was from the following witnesses:

- Jan De Bruyn – General Manager and owner of De Bruyn's;
- Phillip Holland – former driver with De Bruyn's, who gave evidence about discovering Mr Carver's vehicle after the rollover and about the route, training, loads and vehicles;
- Glenn Moss – experienced driver with De Bruyn's who gave evidence about the condition of the tanker, the route, training, loads and vehicles;
- Mark Kramer – transport inspector with the Department State Growth, who gave evidence about the condition and type of suspension on the prime mover, and his knowledge of industry recalls or deficits;
- Leon Fewkes – an experienced driver and employee of Dr Bruyn's who worked with Mr Carver and provided evidence about Mr Carver's driving, training by De Bruyn's, the route, the loads and the vehicles;
- Roger Stone – manager of De Bruyn's Hobart depot who provided evidence about Mr Carver's induction and training;
- Ferdinand Kroon – Risk and Compliance Manager with De Bruyn's regarding Mr Carver's training and driver training and policies generally;
- Dr Arnold McLean – engineer and principal of McLean Technical Services who gave evidence of his opinion regarding the contribution of the air suspension system to Mr Carver's rollover;
- John Ruller – independent collision analyst who provided an opinion upon the cause of the rollover, Dr McLean's opinion and Mr Carver's training; and
- Shane Richardson – Principal Forensic Engineer, Managing Director and owner of Delta V Experts, who provided evidence about the cause of the rollover, Dr McLean's opinion, Mr Carver's training and baffling of trailers.

Mr Carver's background

17. Todd Andrew Carver was born on 5 December 1971 and was 42 years of age when he died. He spent his adolescent years in the Dover area. Mr Carver was married to Fiona Michelle Carver and they have two children. Mr Carver also has two children from a previous marriage.

18. Mr Carver joined Tasmania Police on 7 May 1990 and graduated in December of that year. Upon graduation, Mr Carver was posted to Hobart. He served at Maydena, Glenorchy, Eastern District Traffic, Kingston, Tasmania Police Academy, Queenstown and the Police Radio Room.

19. Whilst at the Police Academy, Mr Carver was an operational skills instructor in charge of driver training. This training included instruction for all vehicles driven by police officers in Tasmania Police. This training is centred on instruction in low-risk driving behaviour.

20. Mr Carver was a passionate motorcycle enthusiast and completed the Tasmania Police Motorcycle Course in March 2000. From that date onwards he was involved in riding police motorcycles in roles requiring high levels of skill.

21. Mr Carver resigned from Tasmania Police in August 2011 and in October 2011 he gained employment driving trucks for De Bruyn's, working in suburban deliveries. Mr Carver drove for De Bruyn's for almost 12 months at that time.

22. Mr Carver left De Bruyn's and began working for Driver Safety Services as a driver trainer and assessor. During this time, Mr Carver trained De Bruyn's drivers in the TruckSafe program. While at Driver Safety Services, Mr Carver obtained his heavy combination licence, enabling him to drive a prime mover or truck towing a trailer.

Commencement of employment on the fish run

23. On or about 17 November 2013, Mr Carver returned to employment with De Bruyn's to drive heavy combination vehicles on the 'fish run'. This involved Mr Carver driving prime movers and laden fish trailers at night between Port Huon and the premises of Huon Aquaculture in Hideaway Bay. The route driven was along Esperance Coast Road, a distance of approximately 20 kilometres. Esperance Coast Road is a narrow road with a single lane in each direction and not constructed for heavy vehicular traffic.

24. As part of the fish run, Mr Carver was required to have ice slurry, a mixture of ice and salt water, loaded into the empty trailer at Port Huon before driving to Hideaway Bay where fish were added to the trailer. Once the fish had been loaded into the trailer at Hideaway Bay, Mr Carver drove the same route back to Port Huon where the trailer was filled with more ice slurry. The trailer load of fish and slurry is then delivered to the fish processing factory at Parramatta Creek in north west Tasmania. It was not Mr Carver's job to drive to Parramatta Creek with the full tanker.

Circumstances of death

25. The circumstances of death were set out by Coroner Carey in his finding. There is no suggestion by any of the interested parties that any such factual findings were not made in accordance with the evidence. Further, I am satisfied that, in respect of such findings, they were founded upon credible and comprehensive evidence. It is unnecessary to depart from those findings and they are replicated below from the original finding.

On Sunday, 13 July 2014 after sleeping in until approximately midday, Mr Carver had lunch with his family at their home and then spent time with his family, playing with his children at a local park. After returning home he had his evening meal at about 6.00pm, got ready to go to work, and after helping his wife prepare their children for bed he left for work.

He commenced work at 7.15pm at his employer's depot (De Bruyns Transport) at Gormanston Road, Moonah. He left the depot at 7.36pm driving a Mack Trident Prime Mover registration number C97JY which was towing a Tieman Fish Tanker registered number Z46PO. Mr Carver has driven this vehicle to Port Huon, arriving at approximately 8.30pm and the tanker was loaded with approximately 4,000 litres of ice slurry. He then left Port Huon and travelled to Hideaway Bay leaving at approximately 9.00pm. He arrived at Hideaway Bay at 9.24pm and positioned the Prime Mover and Tanker in order to allow it to be loaded with fish. He has then gone to the crib room to await the loading of his vehicle at which time he spoke to a fellow driver, Mr Leon Fewkes. Mr Fewkes reports that Mr Carver was relaxed and appeared to be in a good frame of mind and they discussed general family matters. Mr Fewkes asked Mr Carver what time he had to be back and his reply was "a couple of hours" which means he had plenty of time to perform his delivery task.

Mr Carver has left Hideaway Bay with his load at 11.08pm and began travelling back to Port Huon. The police investigation has determined that Mr Carver has driven a distance of approximately 4km north-bound along Esperance Coast Road at which point he was driving down a slight incline and has commenced to negotiate a closed left-hand curve. The trailer has started to move out to the right-hand side of the corner and has gone over an embankment on the eastern side of the road with the weight and rotation of the trailer causing the Prime Mover to flip onto the driver's side. The truck and trailer have slid down the embankment with the cabin striking an Aurora power pole and trees, roof first. The truck and trailer have come to rest in close proximity to one another approximately 15m down the embankment.

Phillip Holland, a fellow driver, had arrived at the Port Huon yard at around 11.00pm, hooked up a trailer and put ice slurry in and left the yard at approximately 11.07pm. In the course of his

journey towards Esperance Coast Road, he had attempted via his UHF radio to contact Mr Carver as, in normal course, he would pass his truck coming in the other direction on the Esperance Coast Road. Such contact was the normal course in order that both drivers could prepare to pass safely when they met on Esperance Coast Road. Mr Holland was unable to contact Mr Carver and proceeded along Esperance Coast Road with his speed reduced as he did not know where the other vehicle, being driven by Mr Carver was, on the roadway. As he rounded a right-hand corner before the accident scene, he could see truck lights but it was not until he arrived at the scene that he realised the truck had been involved in an accident and was located down the embankment. He immediately called the fish farm and informed them of this, requesting that ambulance, police and SES be notified. He thereafter went down to the damaged truck and called out for Mr Carver as he was unaware of whether he was in the vehicle or had been thrown clear. He then located Mr Carver, seated in the vehicle, but could not gain access to him nor could he get any response from him. A number of persons from the fish farm attended the scene and attempted to gain access to the vehicle to get Mr Carver out but without success.

Police officers arrived at the scene at about 11.55pm. I/C Constable Silk noted that the rear window of the Prime Mover had come out and he could see the left side of the driver in his seat, pinned by the roof of the truck. He attempted to find a pulse by checking the driver's neck and left wrist but could not find one. He then looked through the driver's window and observed that Mr Carver's eyes and mouth were open and there appeared to be no signs of life. He noted that Mr Carver was facing to the right as the roof was pressing down on the left side of his face and head and the roof had also compressed onto his chest area. A Tasmanian Fire Brigade unit arrived at the scene and fire officers and SES personnel took steps to disconnect the vehicle battery as it was noted fuel was leaking from the driver's side fuel tank. Ambulance personnel arrived at the scene at 12.10am and the attending ambulance officer confirmed that Mr Carver was deceased.

Attending police identified the extent of the crash scene and secured that area with Tasmanian Police Forensic Services and the Crash Investigation Service officers arriving later to commence a formal investigation of the accident.

The post-mortem identified that Mr Carver had marked congestion of the upper chest, face and head but only superficial injuries of the face and body. There was congestion of the eyes and scatter petechiae on the lower eyelids. Copious food debris was located within the airways. Fatal traumatic injuries were not identified externally or internally; however aspirated food was identified in the lungs. The conclusion from these findings were that Mr Carver had succumbed to traumatic/positional asphyxia that occurred when the roof of the cab of the truck was compressed

onto his upper body when it rolled down the embankment. The position of the head and airway prevented normal respirations leading to death by asphyxia.

When the roof cabin was removed to allow Mr Carver to be extricated from the vehicle he was sitting in his normal driving position with his seatbelt on. His right and left hands were positioned as if they had still been on the steering wheel when it came to rest. There was no indication that he had made any attempt at moving his position after the crash which indicates that he was unconscious after impact.

Coroner Carey's further findings

26. Relevantly, Coroner Carey also made findings and recommendations as follows:

- The rollover threshold for the prime mover was 43 km/h and the speed of the prime mover could have been only 4 km/h over that threshold speed. Additionally, the effect of "slosh and surge" of the load in a single compartment tanker is likely to have increased the vehicle's propensity to roll.

- There was no evidence to suggest that Mr Carver's speed leaving Hideaway Bay was inappropriate or excessive and that Mr Carver would not have been aware of the critical curve speed or rollover speed. He noted that, in the case of liquid loads, drivers could not know in advance the exact rollover speed, due to the number of variables in play on each individual journey.

- That airbag suspension, such as that fitted to the prime mover, was stable and more comfortable to drivers than conventional leaf style suspension. However, airbag suspension divorces the driver from the feel of the road.

- That since the rollover, the shoulder of the road has been extended and six guide posts have been placed around the curve. Additionally, a 35 km/h advisory sign has been erected at that corner.

- Coroner Carey recommended that there be compulsory training in rollover preventions for all persons licenced to drive heavy rigid vehicles who are exposed to such a risk.

- Coroner Carey also recommended that there be consideration given to inserting some form of baffle, at least transversely, in order to minimise the slosh and surge effects of the load within a trailer with a single open chamber.

Causation for the crash

27. The original crash investigation by Senior Constable Kelly Cordwell and Sergeant Rodney Carrick was very thorough. In the re-investigation, I also had the benefit of the opinions of two further highly qualified experts who provided evidence regarding the rollover. They were Dr Shane Richardson, experienced mechanical engineer, and Mr John Ruller, experienced road crash investigator and collision analyst. Both experts provided very detailed reports reconstructing the crash circumstances after attending the collision location and reviewing the documentary evidence and Electronic Brake System (EBS) data from the trailer.

28. Both Dr Richardson and Mr Ruller provided logical and detailed analysis of the evidence and of the conclusions of the original crash investigators. Their conclusions concerning the essential factors causing the rollover were not challenged at inquest by any counsel.

29. From their evidence, I am able to find that the rollover occurred because Mr Carver was travelling through the curve at a speed that was too high for the radius through which it was turning and for the load which it was carrying. That is, if Mr Carver had travelled at a slower speed or driven a wider turn radius the rollover would not have occurred.

30. Like Coroner Carey, I am satisfied upon the evidence that Mr Carver was travelling at a speed only just over the rollover threshold speed.

31. EBS is a sophisticated system containing sensors that detect the stability of the trailer as measured by lateral acceleration. The system may assist in maintaining the stability of the trailer by the automatic application of brakes. It may predict, for example, that a rollover is about to happen and apply the brakes differently to particular wheels in order to prevent that occurrence.

32. On the basis of the expert evidence about the EBS data, I am able to find that the speed of the vehicle just before rollover was approximately 39 km/h. At the time of this speed being recorded the system showed that there was a "slow wheel recovery", indicating that a wheel had slowed and then not sped up as the EBS would expect. At this time, the system was powered up, the warning light was on and there was no foot pedal brake applied. Within three seconds of the slow wheel recovery, the speed of the vehicle was shown at 0 km/h and the lateral acceleration signal was activated. It appears that, at this stage, the rollover was taking

place with the wheels stopped and/or in the air.[4] Dr Richardson provided a particularly detailed and technical analysis of the EBS data in coming to his conclusions.

33. Although there was some disagreement regarding the actual radius of Mr Carver's turn, both experts agreed that his speed only exceeded the rollover speed threshold by a very small amount. Dr Richardson was of the opinion that if Mr Carver had travelled at 1 km/h slower, or had braked leading into and/or during the transition through the curve to slow by 1 km/h, the rollover would not have occurred.

Issues associated with liquid or movable loads

34. It is well-recognised that liquid or movable loads carried in trailers or tankers can contribute to rollovers. The load carried by Mr Carver was not liquid but I am quite satisfied that it was movable or dynamic. When the tank is full, very little load movement is possible. However, when the tank is only partially full and experiencing a lateral acceleration by cornering, the load will shift sideways. This sideways movement or "slosh" also causes the centre of gravity of the vehicle to shift sideways which reduces its rollover stability. In general terms, the larger the air gap, known as "ullage", the greater possibility for the dynamic load within the tank to slosh. If the trailer was full the driving issue caused by ullage is removed.[5]

35. The trailer driven by Mr Carver had a capacity of 30,000 litres. About 4,000 litres of ice slurry was loaded into it at Port Huon after which Mr Carver drove to Hideaway Bay. At Hideaway Bay there was 3,731 fish placed into it, being a mass of approximately 18,000 kilograms. Therefore the load of the trailer equated to about 22 tonnes at the time of Mr Carver's fateful journey from Hideaway Bay to Port Huon. This known mass does not allow an easy calculation of ullage. However, upon the evidence, it is most likely the case, upon the estimation of experienced witnesses, that the trailer was between 75% and 85% full, with 15% to 25% ullage.[6] Both Mr Ruller and Dr Richardson were of the opinion that the ullage cannot be precisely known.

36. Phillip Holland, a De Bruyn's driver, stated that, in his view, the trailer did not need to be used due to the amount that it was capable of holding, stating that the load Mr Carver had on board could have been transported in the curtainside tanker, which is smaller.[7] According to Mr De

[4] C 37.
[5] Transcript, page 33, Mr Ruller's evidence.
[6] For example, C 42 Affidavit of Jan De Bruyn, paragraph 90.
[7] C 8, Affidavit of Phillip Holland.

Bruyn, it was not a large load of fish and the tanker could have held a lot more. He noted that Huon Aquaculture harvests to order, and therefore determines the quantity of the loads.[8]

37. I am satisfied that the degree of ullage in the trailer posed a risk of instability that contributed to the rollover. Dr Richardson accepted that there could have been some slosh proportional to the air gap in the tanker[9] but doubted that the phenomenon of "surge" was in operation due to the likely lack of longitudinal movement of the load at the time of the rollover.

38. Finally, I accept the evidence of both experts that the tanker, being more unstable with a lower roll threshold than that of a prime mover, rolled first. The speed, the path travelled, slope of the roadway on the exit of the curve and the movement of the load all caused the tanker to roll, also dragging the prime mover containing Mr Carver into a rollover.

39. Mr Ruller observed that that the tyre marks from the prime mover ceased on the bitumen surface and no such marks were made in the soft ground of the embankment. Further, the fibreglass shavings embedded on the road surface also indicate that the prime mover rolled over onto its right side on the road surface, having been brought onto its side by the rolling trailer. He noted that a prime mover has a much higher roll threshold than that of a loaded trailer and that the learning shows that it is inevitably the trailer that commences to roll in such circumstances. He said that, as it does, the movement in the fifth wheel connection (between the prime mover and trailer) is taken up. Until that time a driver will most likely be unaware of what is about to occur. He stated that once the movement in the fifth wheel has been taken up, the rolling trailer will start to lift the prime mover and eventually take it over. In the case of the prime mover driven by Mr Carver, its cabin came into contact with the power pole and trees as it was pulled over by the trailer and down the embankment. This resulted in the cabin being crushed and the death of Mr Carver.[10]

Other possible causes of the rollover

40. Upon the evidence, I am satisfied that there was no obstruction or issue with the surface of the roadway that contributed to the crash. I am satisfied that the weather conditions were fine and played no part in the crash.

[8] C 42, paragraph 90.
[9] C 40, page 34.
[10] C 37, paragraphs 192, 193 and 194.

41. On 14 July 2014, Mark Kramer, a transport inspector with the Department of State Growth, attended the crash scene where he made an inspection of the vehicle. The following day, he inspected the prime mover in Hobart. He concluded that prior to and at the time of the crash, both the prime mover and trailer were mechanically sound and roadworthy. Inspection did not reveal any fault that may have caused or contributed to the collision. I accept his opinion.

Dr McLean's opinion

42. In his letter to Coroner Carey of 5 February 2018, Dr McLean asserted that unsafe characteristics of the air suspension on the prime mover driven by Mr Carver contributed to the rollover. In forming his opinion, he relied particularly upon the fact that the prime mover was fitted with a Hendrickson HAS 400 floating "Z" link tandem drive air suspension, which model was instrumental in rollovers.

43. It is worth setting out the section of his letter that explains the essence of his opinion:

> *Post passing the Huon Charm Waterfront Cottage at 572 Esperance Coast Rd, in the northerly direction, Mr Carver's vehicle ascended a relatively steep windy section of the road of some 300 metre* (sic) *in extent. During the ascent the prime mover would have been operated in a relatively low gear to apply sufficient torque to the drive wheels to cause the vehicle combination to ascend the road grade. During this drive wheel high torque operation phase the tandem axle air suspension would have exhibited the phenomena of frame rise. Subject to frame rise the tandem axle air suspension air springs implode and post sufficient time become completely deficient in air pressure.*
>
> *Hence when Mr Carver's prime mover reached the crest of the climb (at approximately the northern boundary of No. 564 / 537 Esperance Coast) the tandem drive air suspension air pressure was void. With the air pressure in the air springs void the prime mover's tandem drive suspension would have exhibited minimal roll resistance.*
>
> *Post the ascent crest Mr Carver's vehicle travelled at relatively slow speed along a relatively high quality surface for some 300m (3 off power pole spaces approximately). Mr Carver allowed his vehicle to operate passively along this section of road so much so that he did not need to apply brakes entering the subject accident left hand curve. Here it should be noted it is common practice for semi trailer drivers not to apply brakes to avoid the risk of the articulated vehicle jack knifing. This brake application avoidance was particularly strong for yesteryear trained and experienced mechanical suspended prime mover drivers.*

Unbeknown to Mr Carver the tandem drive air suspension frame rise was locked in. Furthermore it is blatantly evident the subject left hand curve was the first curve post a substantial sustained positive torque application (as occurred when the prime mover ascended the previous grade). This combination of variables so exposed the combination to high risk of loss of control according to air suspended heavy vehicle accident scenario # 3 previously reported by the undersigned. Most concerning prime movers installed with HAS suspensions, particularly HAS 400 suspensions, exhibit high accident risk in the stated accident scenario. (In comparison Volvo prime movers which incorporate significant torsion bars (or anti roll bars) to assist develop the suspension's roll resistance exhibit high statistic in accident scenario # 2.)

Since Mr Carver did not dab the prime mover brakes or briefly apply the trailer brakes the tandem drive axle group suspension frame rise remained locked in as he applied left hand lock to negotiate the left hand curve. (Had Mr Carver dabbed the prime mover brakes for a brief instant (sufficiently short to avoid the incidence of jack knifing the suspension frame rise state would have been cancelled. Had Mr Carver dabbed the prime mover's brakes just prior to entering the subject corner he would still be alive.)[11]

44. In his letter, Dr McLean went on to say that by virtue of the state of the suspension whilst locked in "frame rise", the prime mover was effectively suspended on "marshmallows" and possessed minimal roll resistance. As such, the chassis twisted to the off side, so offloading the tyres along the near side causing the prime mover to cross onto the opposite lane with the outside steer tyre leaving the embankment and its cabin making impact with the power pole. The impact caused the trailer to separate from the prime mover and to subsequently roll down the embankment.

45. Dr McLean ended his letter by expressing concern that should the true cause of Mr Carver's death not be identified and reported, ongoing serious and fatal accidents would continue unabated in Tasmanian road haulage activities.

46. Dr McLean subsequently provided further evidence in the re-investigation, including a paper authored by him for the 2009 Australasian Transport Research Forum entitled *"Suggested Heavy Vehicle Air Suspension Contribution to Fatal Accident Statistics and Signatures"*.[12] He also swore two affidavits providing his opinion as to the cause of the rollover. In the affidavits, he

[11] Exhibit C 36.
[12] Exhibits C 36A and C 36B.

maintained that the issue that he raised in his initial letter remained a cause of Mr Carver's rollover.[13]

47. Additionally, three reports were tendered at inquest by counsel for De Bruyn's that were previously authored by Dr McLean and provided to Wallace Wilkinson & Webster Lawyers in 2016 and 2017.[14] It is apparent that that firm had previously retained Dr McLean on behalf of De Bruyn's in the context of civil proceedings associated with Mr Carver's death. Such civil proceedings are not the concern of this inquest. I note, however, that Dr McLean did not reveal in his initial correspondence to the Court that he had been retained by Mr Carver's employer, that he had been provided with investigative information as part of that retainer and that he had authored these three reports. The fact of his prior involvement only became known to me during the re-investigation period, when De Bruyn's solicitor provided that information to the Coronial Division.

48. Dr McLean's first two reports prepared for Wallace Wilkinson & Webster appear to affirm his opinion regarding the contribution of the airbag suspension to Mr Carver's death for the same reasons given in his initial letter to the Court. His third report deals solely with his opinion that the risk of a loss of control would have been significantly reduced had the prime mover been fitted with a standard HAS 460 air suspension system and not an HAS 400 suspension.

49. Dr McLean also gave oral testimony at inquest.

Difficulties with Dr McLean's evidence

50. Dr McLean's approach to the Court with his opinion, which required due consideration, had the effect of considerably extending the re-investigation and inquest with ultimately no benefit. For the reasons set out below, I discount his opinion as being relevant to Mr Carver's death. Significant issues arise in respect of his qualifications and experience, the facts assumed by him, his impartiality and his credibility.

Lack of evidence of qualifications

51. I accept that Dr McLean is a qualified engineer with an interest in heavy vehicle air suspension and its alleged contribution to fatal accidents. His reports state that he is the principal of McLean Technical Services but I cannot determine what services that business provides. The full extent of his qualifications and experience is not easily seen from his reports and

[13] Exhibit C 38.
[14] Exhibits C 55-56.

documents tendered in evidence. In his initial letter, he did not provide details of his expertise and the only indication of his qualifications were letters following his signature, these being *"PhD (UoW), BE Hons 1 (UNSW), CPE, FIEAust, MASME, MACRS"*.

52. Dr McLean stated in his affidavit that he has been "heavily involved" with air suspended heavy vehicles *"post circa February 1998",* although he did not attach his curriculum vitae to the affidavit as he indicated he had done.[15] He stated that he had forwarded his *curriculum vitae* at a time previously, which is possible, however it is concerning that he did not choose to ensure that his qualifications and experience were brought to the attention of the Court. The lack of proper exposure of his qualifications and relevant experience was most unsatisfactory, particularly given the highly technical nature of the matter raised.

Incorrect assumed facts

53. Dr McLean did not undertake any comprehensive analysis of the scene evidence similar to that completed by Mr Ruller and Dr Richardson. Those experts set out fully and clearly their reasoning regarding the occurrence of the rollover, with both in substantial agreement as to how it happened. It is clear to me that as a matter of logic, sound expert opinion and evidence at the scene, that the partially laden trailer (with its lower roll threshold) rolled first and irretrievably and, as it did, it caused the prime mover to flip over on the road.

54. It is contrary to the scene evidence and expert crash analysis to find that the prime mover, by virtue of its state of frame rise, instigated the rollover. Yet Dr McLean maintained that this was the case, even in his oral evidence after presumably having considered the carefully reasoned and comprehensive reports of Mr Ruller and Dr Richardson, whose views were to the contrary. He stated in answer to a question from counsel assisting that if the prime mover had not been subject to frame rise, it would have remained upright and would have been able to contain the roll of the trailer.[16]

55. Dr Richardson, Mr Kramer and Mr Ruller all provided evidence that they were not familiar with the phenomenon postulated by Dr McLean.

56. Mr Kramer stated that he had been to many crashes and incidents and liaised with many industry personnel in a period of over 30 years in the industry. He said that he had not heard

[15] C 38, page 1.
[16] Transcript, page 95.

of frame rise in the context of Dr McLean's theory and had not encountered any incidents where it was said to have caused such an issue.[17]

57. Mr Kramer was firm in his evidence that he would have known through the Vehicle Standards area if there was any safety issues or recalls in respect of the operation of airbag suspension. He said there had been none. This was subsequently confirmed in the affidavit filed on behalf of Hendrickson.

58. Mr Ruller provided comments in response Dr McLean's conclusions. It is unnecessary to repeat them all. He strongly disagreed with Dr McLean's view on the sequence of the rollover. Although he was not familiar with Dr McLean's theory, his analysis is helpful. He has an extensive educational and research background in traffic crash investigation and reconstruction, combined with over 36 years of practical experience involving reconstruction of over 1000 serious and fatal traffic collisions.

59. Mr Ruller stated that it would more likely be the case that once the vehicle reached the crest and the drive wheel torque reduced so too would the frame rise. Thus the ride height would once again drop back to normal and air returned to the suspension. He questioned how frame rise could be "locked in" once torque is no longer applied to the drive wheels, considering the vehicle travelled down a -2% gradient road slope – in this regard, he said that graphs indicate that as speed increases, frame rise decreases.

60. In relation to the circumstances of the rollover, Mr Ruller analysed inaccuracies in Dr McLean's purported reconstruction. He made particular mention of Dr McLean's incorrect belief that the tyre scuff marks leading into the curve were caused by the outside steer tyre of the prime mover. Mr Ruller stated, and I accept, that the scuff marks were those made by the outside tyres of the trailer. I accept Mr Ruller's view that Dr McLean has formed his opinions on a research paper that is based on statistical data only and he has not critically evaluated the physical evidence left as a result of this crash.

61. It defies logic to find that when the trailer initiated the rollover, with its momentum taking the prime mover over with it, the suspension system on the prime mover could have made any difference to the tragic outcome.

62. Dr Richardson stated in evidence that he had previously heard of the theory propounded by Dr McLean and understood some of the issues involved. However, he said that Dr McLean had

[17] Transcript 17.12.20, page 37.

provided no objective evidence to support his assertion that the tandem drive air suspension frame rise was "locked in". He stated that *"in the absence of any objective evidence to support his assertion, the Author accepts that Dr McLean's premise is an unproven theory based on a belief that Dr McLean has. The Author disagrees with Mr* (sic) *McLean with respect to the cause of this rollover, especially given that Dr McLean appears to have failed to reconstruct the crash circumstances, attend the collision location and/or evaluate the EBS data."*[18]

63. In evidence, Dr Richardson said that Dr McLean's theory is just not supported by the data and in his experience of analysing truck crashes. He said that *"trucks roll over because their centre of gravity is high, not because the suspension jacks the centre of gravity up higher".*[19] He clearly conveyed that, in his view, Dr McLean's theory was not worthy of consideration.

What was the make and model of the suspension system fitted to the prime mover?

64. Importantly, Dr McLean asserted that it was a Hendrickson HAS 400 air suspension, fitted to Mr Carver's prime mover, that contributed to the rollover and that this model suffered particularly from the safety issue he describes. By way of explanation, the HAS 460 possesses a vertical load capacity of 46,000 pounds, whilst an HAS 400 model suspension has a vertical load capacity of 40,000 pounds.

65. The tax invoice for the purchase of the Mack prime mover described the suspension fitted to the rear axle of that vehicle as "AL 460".[20] The AL460 suspension is made and designed by Mack. Mr Kramer gave evidence that the system appeared to be a "Hendrickson type", and Mr De Bruyn gave evidence that he was of the view that at least some Hendrickson components had been used in the suspension system. However, he seemed to accept the proposition that Mack had designed and engineered the system and fitted products from different manufacturers.[21] There was no comprehensive documentary evidence of the details of the design and composition of the system's components available at inquest.

66. Mr Richardo Martin, Vice-President of International Operations of Hendrickson, swore an affidavit after the completion of the oral evidence at inquest. He stated that it appeared that some Hendrickson components may have been used in the suspension system fitted to the prime mover, but it is not clear whether all of the components were Hendrickson. He stated that Hendrickson had no evidence to confirm that it designed and engineered the air

[18] C 40, page 59.
[19] Transcript, page 53.
[20] Exhibit C 46.
[21] Transcript 16.12.20, page 29, lines 20 – 25.

suspension system for this particular model of Mack prime mover. He said that it was likely that Mack, or some other company acting for Mack, had undertaken the design and engineering work for the air suspension system for the prime mover. Counsel for Hendrickson submitted that for it to be a Hendrickson air suspension system, it should not only comprise Hendrickson components, but be engineered and designed by Hendrickson for use in the particular truck to which it is fitted. He submitted that it does not follow that just because some Hendrickson components had been used, that it was a Hendrickson system designed and manufactured by it for use in that vehicle. Such submission has force. Dr McLean did not touch upon this issue.

67. Therefore, the evidence suggests that there may have been some Hendrickson components in the air suspension system fitted to the prime mover, but that it is quite feasible that not all were Hendrickson components. It is quite plausible on the evidence that the air suspension system was not designed and engineered by Hendrickson.

68. Although the exact composition of it is unclear, it is beyond doubt (as confirmed by the documentation) that the suspension was a 460 model. Mr De Bruyn, in evidence, was adamant that a 400 suspension was not fitted to the prime mover, stating that this model was unavailable and unsuitable for the Mack Trident prime mover in question.[22]

69. Dr McLean is therefore incorrect in his assertion that the suspension was a 400 model. He did not inspect the prime mover or the suspension system. He made an assumption that it was an HAS 400 model and based his opinion on that assumption. He asserted in written reports that the Hendrickson HAS 460 system should have been used instead. [23] Therefore, the 460 suspension system which he said should have been fitted to the Mack, was *in fact* fitted to it.

70. Further, Dr McLean swore two affidavits for this inquest in late 2020. He only sought to have the second one tendered in evidence. The affidavits are very similar but with one exception- the first affidavit refers to the prime mover being fitted with an HAS 400 system, whereas the second affidavit removed references to the model of the suspension system and maintained that there were general faults with air suspension systems.

71. Unconvincingly, Dr McLean also moved away from the importance of the distinction between the 400 and 460 models in his evidence in Court, stating that in the 460 model the problem would still occur[24]. When counsel assisting put to him that he had previously expressed an

[22] Transcript, page 29.
[23] C56 Report 31.3.17
[24] Transcript, page 95.

opinion that a 460 system would be appropriate for the route in question, he was evasive, argumentative and stated that it was a question of the terminology used and that his words had been taken out of context.[25]

72. Counsel for De Bruyn's and Hendrickson validly questioned whether Dr McLean had provided his various reports in accordance with the Expert Witness Code of Conduct and the Institute of Engineers Australia Code of Professional Ethics.

73. They also questioned whether he had some commercial motive for his assertions about faults in air suspension systems generally. In this regard, Dr McLean said in evidence:

> *"I can transfer a HAS400, 460 or 461 into a safe suspension system which I have – there are over 850 vehicles on the road in Australia with safe air suspensions and I can convert a HAS to our [indistinct word(s)] and be adequate for our road conditions and especially the [indistinct word(s)] road conditions in Tasmania."*[26]

74. Thus, in relation to the make and model of the suspension, Dr McLean's opinion is largely undermined by two important factors – firstly, the fact that the 460 model suspension actually fitted to the prime mover did not, on his own theory, possess the defects that he articulated. Secondly, his opinion relied upon the system being a Hendrickson system, when there is good evidence to indicate that it was not designed and approved for the prime mover by Hendrickson but may have contained Hendrickson components.

Manner of giving evidence

75. In evidence, Dr McLean presented as rambling, confusing and unable to provide a coherent, logical response to basic questions concerning his opinion. He was focused solely upon expounding his theory rather than carefully listening and providing answers with an open mind. He interrupted me and counsel constantly and I was required on several occasions to firmly request that he not interrupt and to respond in a concise and relevant manner.

76. During his evidence I also needed to remind him of his duty as an expert witness to be of assistance and that his failure to answer questions directly and interrupting was not helpful.[27] He also was prone to the use of intemperate language and superlatives in his court evidence and in his reports. For example, he gave evidence that he was *"horrified"* when he inspected the

[25] Transcript, pages 97 and 98.
[26] Transcript 17.12.20, page 100.
[27] Transcript, page 97.

first air suspended vehicle in 1998. He described Mr Kramer's report as *"grossly deficient"* in particular respects and the police accident investigators as being *"completely ignorant"* in various respects. Such language is inappropriate for an expert and detracts from his credibility.

77. In *Lowe v Mack Trucks Australia Pty Limited*[28], Justice Kenny of the Federal Court commented in detail upon the evidence of Dr McLean, who provided expert evidence in that case concerning defects in a Mack truck. In his analysis of the evidence, Her Honour dealt with some of the same difficulties exhibited by Dr McLean at this inquest.

78. Her Honour stated in separate passages of the judgment:

> *"Dr McLean's evidence did not differentiate between his assumed facts or assumptions and his 'expert' opinion. These assumed facts and assumptions were in most cases unproven and untested. Much of his evidence was virtually incomprehensible, ill-ordered, illogical or manifestly erroneous."*[29]
>
> ……
>
> *These assumed facts and assumptions were never properly identified and proven. The inspections and data analysis were shown to be demonstrably unreliably or wrong; the relevant reasoning processes, questionable; and his account disorganised.*[30]
>
> ……
>
> *A good deal of Dr McLean's evidence, including both his written report and oral evidence at trial, was incomprehensible, inconsistent and illogical. He could not identify his reasoning, at least not readily, and sometimes not at all. When he did so, the difficulties with it were patent."*[31]

79. Unfortunately, Dr McLean's evidence in this inquest suffered from the same problems and can be categorised in the same way. For the reasons given, the phenomenon expounded by Dr McLean, if it does exist, has no applicability to the rollover causing Mr Carver's tragic death. It is most unsatisfactory that Dr McLean, a qualified engineer, has sought to use the facts surrounding Mr Carver's tragic death not only incorrectly but as a platform to ventilate an unproven theory.

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[28] [2008] FCA 439.
[29] para 206.
[30] para 207.
[31] para 214.

Training issues relevant to Mr Carver's death

Mr Carver's experience and competence as a driver on the fish run

80. I have already discussed Mr Carver's extensive general experience as a driver and driving instructor. He was appropriately licenced to drive heavy combination vehicles for the fish run, although he had only held that licence for a short time before he started. Before his re-employment with De Bruyn's he had no experience in driving heavy combination vehicles. It is also unlikely that he had experience driving movable loads.

81. Before his death, Mr Carver had been driving the fish run for a period of almost 8 months from the commencement of his employment on 17 November 2013. He was regarded as competent and safe. There were no issues of substance with his driving during this period. His driving was undertaken five nights per week with two runs per night. He had driven about 350 runs before his death.[32] As discussed above, each "run" involved Mr Carver driving a prime mover and trailer, in various combinations, along Esperance Coast Road between Port Huon and Hideaway Bay.

Training of Mr Carver by De Bruyn's

82. Mr Carver was given some training when he commenced his first period of employment at De Bruyn's in October 2011. His role was to undertake suburban deliveries as a pickup and delivery driver. Mr Kroon, Risk and Compliance Manager at De Bruyn's, said that Mr Carver completed a driving assessment when he was first employed as a driver by De Bruyn's in 2011. He stated that Mr Carver was "fully inducted as a driver" at that time. The records available to me regarding such induction and training in 2011 include an induction checklist signed by Mr Carver and computerised employee record. These indicate that Mr Carver was inducted into various standard procedures and work requirements.

83. Relevantly, the records indicate that Mr Carver was inducted into the TruckSafe Employees Manual and received training in and/or copies of various Standard Operating Procedures ("SOPs"). Some of these included Chemical Spill Response, Handling Chemicals, Load Restraint (Winch Bar), Loading Freight Containers, Loading Freight Trailers (Tautliners) and Unloading Freight Containers. There is no indication of specific training in rollover prevention or movable loads.[33]

[32] C 43A and C16, Affidavit of Senior Constable Cordwell.
[33] C 43A.

84. Mr Carver was not required to undertake another driving assessment when he was employed again by De Bruyn's in 2013 because of his former employment with Driver Safety Services as a truck trainer and assessor and his overall experience. Mr Kroon stated that this was in line with the fact that Mr Carver, himself, was providing training in Certificate 3 driving operations and that was the qualification to which De Bruyn's training was directed.[34]

85. On the day of commencing his re-employment for De Bruyn's driving the fish run, being 17 November 2013, Mr Carver's driver log records that he drove the prime mover and trailer from the Hobart depot of De Bruyn's to Port Huon, then from Port Huon to Hideaway Bay. At 11.00pm he drove from Hideaway Bay to the Hobart depot.[35] There is no indication in that document that he undertook this drive as part of a training run, although the corresponding entry for Mr Fewkes' driver log on the same date states that Mr Carver drove the vehicle (with him) for about five hours between Hideaway Bay and Port Huon and finally back to the depot in Hobart.[36] It is unclear whether Mr Carver was actually a passenger or driver from the wording on this sheet. It is also difficult to reconcile the times recorded on Mr Fewkes' log with Mr Carver's for the same day.

86. By way of explanation, De Bruyn's had a "buddy system" in place whereby new drivers were allocated to experienced drivers as a passenger and also as a driver for training purposes. In the case of Mr Carver, he was buddied to Mr Fewkes. Mr Fewkes gave evidence that he had Mr Carver with him for three days and gave him advice about driving the fish run. He gave evidence that Mr Carver drove satisfactorily and Mr Fewkes reported this fact to one of the managers. This may be the case but there is no paperwork, apart from Mr Fewkes' driver log for 17 November, regarding Mr Carver's buddy training or a record of his assessed performance. There was no system of recording or analysing the results of the buddy training at that time.

87. The following day, 18 November, Mr Carver was involved in his formal induction process, which took three hours from 1.00pm to 4.00pm. Mr Carver signed the induction check list to say that he had been provided with copies of documentation and equipment. Mr Carver had been required to sign off on several SOPs, many being the same as in his first period of employment.

[34] C 41, Affidavit of Ferdinand Kroon, paragraph 6-11.
[35] Mr Carver's Driver log 0004457.
[36] C 59.

88. On this occasion, he was additionally provided with the SOP entitled Harvest Fish Tank and Bin Operations.[37] This covers the operation of loading the tanker hauling the fish. This requires a driver, amongst other things, to monitor the trailer levels of ice, fish and water. It also requires a driver travelling on country roads to observe speed limits, drive to the conditions and approach blind corners cautiously and with reduced speed.

89. Mr Carver was not required to watch the VicRoads Heavy Vehicle Rollover DVD presentation, Fatigue Management DVD presentation or Forklift Safety Essentials DVD presentation as he was given "recognition for prior learning" in respect of those matters. The VicRoads DVD is a very helpful, and no doubt an effective resource which explains the particularly high risk nature of driving trailers with movable loads. It is difficult to see in the documentation that he did complete this training when he was first employed by De Bruyn's. I assume the likelihood is that he did so, or even in his capacity as a trainer with Driver Safety Services. In general, I found it difficult to clearly ascertain how Mr Carver's training took place, the way in which it was done and the documentary components applicable.

90. Mr Kroon also gave evidence that Mr Carver, during his employment on the fish run, had been subject to some random checks of his driving and no concerns were detected.

Comments on Mr Carver's training

91. All of the evidence indicates that special training considerations should apply to those driving this high risk route with dynamic or movable loads.

92. Mr Ruller stated in his report:

> *"Hauling a movable load is completely different to hauling standard freight.*
>
> *A professional driver with many years' experience hauling solid freight and* (sic) *then switches over to hauling a moveable load can very quickly run into difficulties if not provided with training specifically dealing with such a load.*
>
> *With a liquid load, the amount of load being carried can change considerably the handling of the combination over the same stretch of road. On one day the load can feel controlled and comfortable while on another, given the amount of produce being carried, can very much unsettle a seasoned driver.*

[37] C 43A, Induction Checklist 18.11 2013.

A driver needs to know how much load they are carrying and how that load will handle over the roads to be travelled. Otherwise, the overall trip can become a guessing game.

The load can one minute feel stable but the next moment suddenly become very unstable due to some input by the driver. Most drivers will not be aware that there is a problem until such time as they have a wheel lift, by which time it is too late."[38]

93. With respect, I accept the evidence of Mr Ruller, which accords with other cogent industry evidence about the need for strong and targeted training in such circumstances.[39]

94. Mr Carver was not driving carelessly or obviously inappropriately before the rollover, evidenced by his moderate speed at the time of the trailer's wheel lift. It is likely that he did not realise that the trailer was in the process of rollover.

95. A detailed incident analysis report ("ICAM report") was prepared by Mr Kroon that identified that the main causes of the rollover were personal to Mr Carver. Regularly throughout the report, Mr Kroon cited "judgment deficiency", "complacency" and "over-confidence" on the part of Mr Carver.[40] Mr Kroon did not consider training as an issue, concluding that it was adequate, particularly in light of his previous driving and driver instructor experience.

96. Whilst the ICAM report is comprehensive, it emphasises Mr Carver's personal fault to an unhelpful extent instead of conveying that a rollover may easily occur in circumstances of small deviations in correct speed and driving line where the driver is operating diligently. The report did not expressly refer to or analyse the issue of the contribution of the unbaffled tanker being subject to dangerous lateral forces whilst cornering due to its movable load with significant ullage.

97. Mr Kroon did refer in the report to the fact that the fish run was a high risk route and noted how easily a rollover event could occur. He did not, however, go on to analyse why that was the case or consider in any depth the exposure of drivers to the particular risks inherent in it. No doubt this is because of his view that the problem lay almost solely with Mr Carver's erroneous driving.

98. Certainly, it is the case that if Mr Carver had travelled only a little slower around the corner, the rollover would not have occurred. It is possible that he was aware that he should use a

[38] C 37, page 176.
[39] C 64, Vic Roads Rollover awareness package.
[40] C 32.

lower speed for that corner but suffered a moment of inattention. However, there was no advisory speed sign at that stage to indicate an appropriate speed and, as Mr Ruller said, Mr Carver needed to judge this for himself on each trip, with the benefit of the "feel" of the load.

99. Despite these comments concerning the tenor of the ICAM report, Mr Kroon proposed a variety of sound recommendations which have, to De Bruyn's credit, all been implemented. These include setting minimum times for driving the fish run, re-inducting employees into the VicRoads Rollover Awareness program and increasing the frequency of driving and stability checks using available systems.

100. There was, properly, some focus at inquest upon the fact that, despite Mr Carver's many drives on the fish run, he drove less than five trips with the combination he was driving on the evening of the rollover. Upon all of the evidence, it is unclear whether this fact made a significant difference to his handling of the vehicle before the rollover.

101. As submitted by counsel for De Bruyn's, the evidence of Mr Moss and Mr Holland who were experienced drivers, did not support the proposition. Mr De Bruyn said in evidence that a change in prime mover does not make any difference in handling ability, whereas the trailer did make a difference.[41] Mr Holland indicated that the other trailer setups and sizes were effectively the same. Mr Moss emphasised that a driver required, in any event, to drive to the load, which was different every day. Mr Fewkes thought that a Volvo cab-over-engine prime mover was safer than a Mack but commented that the job involved driving different vehicles as a vehicle was not personally allocated. I cannot draw any conclusion in respect of whether any unfamiliarity with this combination on the part of Mr Carver contributed to the rollover.

102. Another issue arising is whether Mr Carver was aware of the level of the load in the trailer when he left Hideaway Bay. There is evidence from Mr Fewkes that Mr Carver was in the crib room whilst the fish was being loaded into the trailer.[42] Mr Carver may not have checked the level, or weighed the load, which could have assisted him with stability considerations. There is no documentary evidence to assist on this question.

103. The evidence of Mr Ruller and Mr De Bruyn, together with De Bruyn's documented requirements, demonstrate the importance of a driver visually inspecting the level of the load and knowing its mass to assist in determining how to drive safely with that load. Whilst I accept that the requirement of De Bruyn's is to inspect the fish levels and to ensure that the

[41] Transcript, page 80.
[42] C 10, Affidavit of L Fewkes.

weight of the load is known (using on-board scales), it is unclear whether these requirements are being routinely complied with. There is no exact record of the mass of Mr Carver's load as he left Hideaway Bay. There is also some uncertainty regarding the amount of slurry in the trailer, with estimates ranging from 4000 litres to 7000 litres.[43]

104. Mr Ruller was of the opinion that training was minimal for this route given the type of load that Mr Carver was expected to haul. He said *that "more in depth training may well have given him cause to adjust his driving techniques on this occasion."* [44] This view accords with the affidavit evidence of Wayne Hughes, a retired De Bruyn's driver, who questioned the adequacy of driver experience on unfamiliar roads with shifting loads. Mr Fewkes was of the opinion that the training for the fish run was too brief and inadequate. Other drivers providing evidence did not take issue with the training. Dr Richardson was of the view that it was satisfactory, given Mr Carver's driving experience.

105. In my view, the training provided to Mr Carver was insufficient for the fish run. It was also insufficiently documented. As discussed above, I was not able to ascertain from the driver logs the extent of Mr Carver's buddy training and what driving was undertaken as a driver or passenger. The interviews and/or assessments after the buddy training were informal and not recorded. The current policies and procedures are vastly improved and recognise that a driver may require extensive buddy driving and set out clear training guidelines and requirements for documentation.[45]

106. Further, Mr Carver drove the fish run and/or was a passenger on 17 November before undertaking the formal employment induction the following day. I cannot determine any good reason for commencing driving before the induction.

107. Upon the evidence, it appears that the induction takes place over several hours, with the new employee being provided with copious documentation concerning his/her employment conditions, as well as the TruckSafe Employee's Handbook and relevant SOPs (numbering 15 in the case of Mr Carver). A site tour is also conducted and the three DVD presentations referred to above are also watched by the employee (but not in Mr Carver's case). I could not determine how effectively a new driver might absorb such comprehensive documentation or how the SOPs were presented and explained to an employee. It was unclear whether there was any follow-up process with the employee to assess knowledge of the SOPs.

[43] C 4. Mr De Bruyn suggests the quantity was likely 7000 litres.
[44] C 37, page 36.
[45] C 43C, De Bruyn's Safety and Procedures Manual – May 2019.

108. There was no SOP that dealt with the specific safety issues associated with heavy vehicle rollovers and movable loads specifically relating to the fish run. Mr De Bruyn gave evidence at inquest that, after discussions with Mr Kroon, the SOP would be updated to include consideration of these important issues.

109. According to the ICAM report, Mr Carver's probationary report was not finalised as it should have been.[46] No reason was given and the issue was not dealt with further at inquest. This may have been an opportunity at an earlier date to comprehensively review Mr Carver's driving and reinforce safety issues in respect of the fish run.

110. In hindsight, there was an overreliance by De Bruyn's upon Mr Carver's previous driving experience in assessing his training requirements. Assuming Mr Carver had previously had some training in rollover awareness in 2011 or previously, that training was not undertaken when he was driving heavy combination vehicles. In relation to this critical safety issue, repetition of the important messages can only be of benefit.

Might additional training have prevented Mr Carver's rollover?

111. I cannot find that Mr Carver's rollover would not have occurred had there been greater training emphasis upon the risk issues associated with rollover on the fish run. I also accept that Mr Carver had completed the run on many occasions and was familiar with the road. Nevertheless, in the context of his lengthy previous driving career, he was relatively new to heavy combination vehicles.[47] The driving risk was increased by the movable and loads which varied constantly in their quantities.

112. It is trite to say that, in the area of industrial safety, providing adequate training to employees is not only a matter of regulation, but is essential for safe and healthy workplaces. Where other safety and security measures have been attended to but risks to workers still exist, training is required to provide knowledge, skills and awareness to employees which is responsive to that risk. It is also trite to say that follow-up training and regular checking of the employees is necessary to reinforce the training. It is true that training can never completely protect an employee from lapses of judgement or attention. However, it may go a significant way to establishing habits of performing the work in a safe and careful manner. If that was not the case, training would be pointless.

[46] C 32, page 15.
[47] C 32, ICAM report, page 16, noting Mr Carver's perceived lack of experience in heavy combination driving.

113. It is therefore quite possible that additional training may have reinforced different habits in Mr Carver. He may have given greater consideration in his driving to the risks of dynamic loads when cornering if, for example, he had been required to watch the rollover prevention DVD at induction or if there had been a reminder on rollover prevention at the conclusion of his probationary period. If the SOPs had dealt directly with the issue of rollover associated with movable loads, he may have effectively absorbed such information.

Baffling and trailer capacity

114. The inquest went some way towards exploring the issue of whether the trailers transporting the fish should be baffled so as to contain the slosh and surge, thus reducing the lateral and longitudinal acceleration of the vehicle and correspondingly reducing the risk of a rollover.

115. Coroner Carey noted in his finding that the rollover threshold is affected, upon cornering by the slosh and surge effect. Although he did not discuss the issue of baffling in great detail he stated "*I recommend that some consideration be given to inserting some form of baffle, at least transversely, in order to minimise these effects".*

116. Mr De Bruyn stated in his affidavit and in evidence at inquest that, for hygiene and fish cooling reasons, as well as prevention of damage to the fish, baffles could not be inserted in the tanks. He said that he does not know of any other aquaculture company that uses ball baffles. [48]He said in evidence:

> *"So we did investigate fitting baffles to the tanks in the initial design, but essentially – we talked about – one of the witnesses talked about public health, so hygiene is critical. The tanks have to be cleaned otherwise you end up listeria in the tank, listeria ends up on fish, people end up dying from food poisoning. So hygiene is very critical and it's also the ability to discharge the tank. Essentially the tank arrives at the factory at Parramatta Creek, it plugs into the factory and the fish are sucked out of the tank. If there was baffles in the tank, we wouldn't be able to discharge a tank. There's also temperature issues as well. If there were baffles in the tank you would end up with differentials in temperature and it would actually – the fish wouldn't cool properly."*[49]

117. Mr Ruller stated that:

> *"The fact that the tanker was under baffled would have increased the effects of sloshing and searching of the load. In the operation of a bulk liquid vehicle the moving load can affect its*

[48] C 42, paragraph 87.
[49] Transcript, page 105.

cornering and rollover behaviour. This is due to the partially filled tank. A tank that is filled to anything less than its full capacity allows the liquid to move from side to side and whilst doing so there is a lateral shift of the load which in turn reduces the vehicle's performance in cornering and rollover.

Also, the dynamic motions of the load may occur out of phase with the vehicles lateral motions in such a way as to become exaggerated and thus further reduce the rollover threshold."[50]

118. Dr Richardson was of the view that lateral baffling of the tanker was not particularly warranted given the analysis of lateral acceleration over the life of the tanker showed that for the vast majority of the time, it was exposed to lateral acceleration of less than 0.3 G. He said that the benefit of lateral baffling at lateral accelerations of 0.1 G, 0.2G and 0.3 G would need to be studied and tested to enable objective quantification.[51] He stated that, as the phenomenon of surge was not involved, longitudinal baffles would not have altered the static rollover threshold of the tanker whereas lateral baffles may have, depending upon the degree of slosh. He stated that the effect cannot be quantified without testing a modified tanker with fish, water and ice slurry. He considered that it is not reasonably practicable to install lateral baffles in existing tankers and he thought that lateral and longitudinal baffles would damage the fish.[52] Dr Richardson kept the issue of baffling open subject to consideration of further testing.

119. Although I make no formal recommendations, there is merit in De Bruyn's continuing to give consideration to whether its fish tankers might feasibly be baffled in the interests of driver safety.

120. Similarly, I comment that De Bruyn's should give ongoing consideration to whether the tankers used upon the fish run are of a size that reduces the risk of rollover to the extent possible.

Formal findings

121. I find, pursuant to Section 28(1) of the *Coroners Act* 1995, that:

a) The identity of the deceased is Todd Andrew Carver;
b) Mr Carver died as a result of injuries sustained as a driver in a heavy vehicle rollover in the circumstances set out in this finding;
c) The cause of Mr Carver's death was asphyxia; and

[50] C 37, Mr Ruller's report, paragraphs 154 and 155.
[51] C 40, page 74.
[52] C 40, page 75.

d) Mr Carver died on 13 July 2014 at Hideaway Bay in Tasmania.

Recommendations

122. I **recommend** that De Bruyn's develops a specific rollover awareness and training module, as an adjunct to the employee induction process, which is compulsory for drivers undertaking the fish run and similarly high risk routes involving heavy combination vehicles carrying dynamic loads; and that such module is developed in conjunction with the VicRoads Heavy Vehicle Rollover Prevention program and contains an emphasis upon the particular safety issues associated with the route and tasks to be undertaken by the employee.

123. I **recommend** that De Bruyn's incorporates into its SOPs safety guidelines and procedures for rollover prevention, including guidelines and procedures specifically applicable to the preparation and driving of heavy combination vehicles, dynamic loads and unbaffled trailers.

124. I **recommend** that, upon reviewing an employee's performance at the expiration of the probationary period, there be an assessment of the safety of the driver on the fish run and other high risk routes with particular emphasis on rollover prevention techniques.

125. I **recommend** that, in the three yearly employee refresher training, there be specific refresher training in rollover prevention.

Acknowledgements

126. I extend my appreciation to counsel assisting and the other counsel. I am also grateful for the work of the Coroner's Associates and staff of the Coroner's Office in this inquest.

127. I convey my sincere condolences to the family and loved ones of Todd Andrew Carver.

Dated: 2 July 2021 at Hobart in the State of Tasmania.

Olivia McTaggart
Coroner

LIST OF EXHIBITS IN THE ORIGINAL INVESTIGATION

Record of investigation into the death of Todd Andrew Carver

No.	TYPE OF EXHIBIT	NAME OF WITNESS
C1	REPORT OF DEATH	CONST M SILK
C2	LIFE EXTINCT AFFIDAVIT	DR G KAVABAR
C3	AFFIDAVIT OF IDENTIFICATION	MR A CORDWELL
C4	MEDICAL NOTES	AMBULANCE TASMANIA
C5	POST MORTEM AFFIDAVIT	DR D RITCHEY
C6	FSST TOXICOLOGY REPORT	MS M CONNOR
C7	AFFIDAVIT	MRS F CARVER
C8	AFFIDAVIT	MR P HOLLAND
C9	AFFIDAVIT	MR J BRETT
C10	AFFIDAVIT	MR L FEWKES
C11	AFFIDAVIT	MR G MOSS
C12	AFFIDAVIT	MR R STONE
C13	AFFIDAVIT	MR W HUGHES
C14	AFFIDAVIT	CONST M SILK
C15	AFFIDAVIT	CONST P EDWARDS
C16	AFFIDAVIT	S/CONST K CORDWELL
C17	AFFIDAVIT	SGT R CARRICK
C18	AFFIDAVIT	TRANSPORT INSPECTOR M KRAMER
C19	AFFIDAVIT & DISC OF PHOTOS	CONST T JAMES
C20	TRAFFIC CRASH REPORT	TASMANIA POLICE

C21	**COPY OF DEBRUYN'S TRANSPORT VEHICLE INDUCTION FORMS**	
C22	**COPY OF DEBRUYN'S TRANSPORT STANDARD OPERATING PROCEDURES**	
C23	**COPY OF DEBRUYN'S TRANSPORT STANDARD OPERATING PROCEDURES REGISTER**	**SIGNED BY MR T CARVER**
C24	**DYNAFLEET REPORT**	
C25	**WORK ORDER HISTORY TANKER**	
C26	**WORK ORDER HISTORY MACK TRIDENT 6 X 4 PRIME MOVER**	
C27	**SURVEYS OF SCENE**	
C28	**SCENE DIAGRAM**	
C29	**ARTICLE ON STABILITY EFFECTS OF SLOSHING LIQUIDS AND HANGING MEATS**	
C30	**TANKER SPECIFICATIONS**	
C31	**AUSTRALIAN ROAD TRANSPORT SUPPLIERS ASSOCIATION ROLL OVER STUDY**	
C32	**DEBRUYN'S TRANSPORT INCIDENT FORM**	
C33	**WORK SCHEDULE FOR MR T CARVER**	
C34	**DRIVER LICENCE DETAILS FOR MR T CARVER**	
C35	**DVD- VIC ROADS ROLL OVER PREVENTION PROGRAM AND POWER POINT PRESENTATION**	
C36	**MISCELLANEOUS PAPERWORK**	

LIST OF EXHIBITS IN THE RE-INVESTIGATION AND INQUEST

Record of investigation into the death of Todd Andrew Carver

No.	TYPE OF EXHIBIT	NAME OF WITNESS
C1	REPORT OF DEATH	CONST M SILK
C2	LIFE EXTINCT AFFIDAVIT	DR G KAVABAR
C3	AFFIDAVIT OF IDENTIFICATION	MR A CORDWELL
C4	MEDICAL NOTES	AMBULANCE TASMANIA
C5	POST MORTEM AFFIDAVIT	DR D RITCHEY
C6	FSST TOXICOLOGY REPORT	MS M CONNOR
C7	AFFIDAVIT	MRS F CARVER
C8	AFFIDAVIT	MR P HOLLAND
C9	AFFIDAVIT	MR J BRETT
C10	AFFIDAVIT	MR L FEWKES
C11	AFFIDAVIT	MR G MOSS
C12	AFFIDAVIT	MR R STONE
C13	AFFIDAVIT	MR W HUGHES
C14	AFFIDAVIT	CONST M SILK
C15	AFFIDAVIT	CONST P EDWARDS
C16	AFFIDAVIT	S/CONST K CORDWELL
C17	AFFIDAVIT	SGT R CARRICK
C18	AFFIDAVIT	TRANSPORT INSPECTOR M KRAMER
C19	AFFIDAVIT & DISC OF PHOTOS	CONST T JAMES
C20	TRAFFIC CRASH REPORT	TASMANIA POLICE

C21	**COPY OF DEBRUYN'S TRANSPORT VEHICLE INDUCTION FORMS**	**DE BRUYN'S TRANSPORT**
C22	**COPY OF DEBRUYN'S TRANSPORT STANDARD OPERATING PROCEDURES**	**DE BRUYN'S TRANSPORT**
C23	**COPY OF DEBRUYN'S TRANSPORT STANDARD OPERATING PROCEDURES REGISTER**	**DE BRUYN'S TRANSPORT**
C24	**DYNAFLEET REPORT**	
C25	**WORK ORDER HISTORY TANKER**	
C26	**WORK ORDER HISTORY MACK TRIDENT 6 X 4 PRIME MOVER**	
C27	**SURVEYS OF SCENE**	**S/CONST K CORDWELL**
C28	**SCENE DIAGRAM**	**S/CONST K CORDWELL**
C29	**ARTICLE ON STABILITY EFFECTS OF SLOSHING LIQUIDS AND HANGING MEATS**	
C30	**TANKER SPECIFICATIONS**	
C31	**AUSTRALIAN ROAD TRANSPORT SUPPLIERS ASSOCIATION ROLL OVER STUDY**	
C32	**DEBRUYN'S TRANSPORT INCIDENT FORM**	**DE BRUYN'S TRANSPORT**
C33	**WORK SCHEDULE FOR MR T CARVER**	
C34	**DRIVER LICENCE DETAILS FOR MR T CARVER**	
C35	**DVD- VIC ROADS ROLL OVER PREVENTION PROGRAM AND POWER POINT PRESENTATION**	

C36	**LETTER FROM DOCTOR MCLEAN**	**DR A MCLEAN**
C36A	**ARTICLE**	**DR A MCLEAN**
C36B	**ARTICLE – SUGGESTED HEAVY VEHICLE AIR SUSPENSION CONTRIBUTIONS TO FATAL ACCIDENTS**	**DR A MCLEAN**
C37	**REPORT AND ANNEXURES**	**MR J RULLER**
C38	**AFFIDAVIT 25.09.2020**	**DR A MCLEAN**
C39	**SUPPLEMENTARY AFFIDAVIT**	**MRS F CARVER**
C40	**REPORT**	**DR S RICHARDSON**
C41	**AFFIDAVIT**	**MR F KROON**
C42	**AFFIDAVIT**	**MR J DE BRUYN**
C43A	**EMPLOYER DOCUMENTS – PRE ACCIDENT**	**DE BRUYN'S TRANSPORT**
C43B	**EMPLOYER DOCUMENTS – POST ACCIDENT**	**DE BRUYN'S TRANSPORT**
C43C	**EMPLOYER DOCUMENTS – SAFETY MANUALS**	**DE BRUYN'S TRANSPORT**
C43D	**EMPLOYER DOCUMENTS – SAFETY OPERATING PROCEDURES**	**DEBRUYN'S TRANSPORT**
C44	**PHOTOS**	**DE BRUYN'S TRANSPORT**
C45	**THIRD PARTY DOCUMENTS**	**DE BRUYN'S TRANSPORT**
C46	**TAX INVOICE – MACK TRIDENT 6X4 PRIME MOVER TRUCK 02.07.2012**	**DE BRUYN'S TRANSPORT**
C47	**EMAIL DATED 16.12.2020**	**MR M KRAMER**
C48	**RECORD FROM STATE GROWTH**	**DEPT STATE GROWTH**
C49	**CERTIFIED ROAD–FRIENDLY SUSPENSIONS**	**DEPT INFARSTRUCTURE, TRANSPORT, REGIONAL**

		DEVELOPMENT AND COMMUNICATIONS
C50	**ROAD–FRIENDLY SUSPENSION CERTIFICATE NUMBER**	**DEPT OF TRANSPORT AND REGIONAL SERVICES**
C51	**DIAGRAM DRAWN BY MR K READ**	
C52	**CUSTOMER QUOTE**	**WEBSTER TRUCKS**
C53	**ORDER CONFIRMATION**	**WEBSTER TRUCKS**
C54	**REPORT TO WALLACE, WILKINSON AND WEBSTER DATED 11.11.2016**	**DR A MCLEAN**
C55	**REPORT TO WALLACE, WILKINSON AND WEBSTER DATED 19.12.2016**	**DR A MCLEAN**
C56	**REPORT TO WALLACE, WILKINSON AND WEBSTER DATED 31.03.2017**	**DR A MCLEAN**
C57	**HEAVY VEHICLE LICENCE UPGRADES – TESTING SPECIFICATIONS**	
C58	**STATIC ROLL THRESHOLD CALCULATION SUMMARY**	
C59	**TIMESHEET OF MR L FEWKES DATED 17.11.2013**	**DE BRUYN'S TRANSPORT**
C60	**NHVR MASS AND DIMENSION LIMITS**	**NHVR**
C61	**MACK TRIDENT AXLE BACK SPECIFICATIONS**	**MACK TRIDENT**
C62	**TRUCK SAFE MASS & MAINTENANCE MANAGEMENT ACCREDITATION AWARENESS**	**DE BRUYN'S TRANSPORT**
C63	**AFFIDAVIT**	**RICHARDO ANDREW MARTIN**
C64	**ROLLOVER AWARENESS**	**VIC ROADS**
C65	**INDUCTION SHEET**	**DE BRUYN'S**

MAGISTRATES COURT *of* TASMANIA

CORONIAL DIVISION

RECORD OF INVESTIGATION INTO DEATH (WITHOUT INQUEST)
Coroners Act 1995
Coroners Rules 2006
Rule 11

I, Stephen Carey, Coroner, having investigated the death of Todd Andrew Carver

FIND THAT:

(a) The identity of the deceased is Todd Andrew Carver;

(b) Mr Carver died in circumstances described in this finding;

(c) Mr Carver died on 13 July 2014 at Esperance Coast Road, Surges Bay, Tasmania;

(d) Mr Carver died as a result of traumatic positional asphyxia suffered as a result of a single-vehicle truck roll-over;

(e) Mr Carver was born in Franklin, Tasmania on 5 December 1971 and was aged 42 years at the time of his death; Mr Carver was a married man whose occupation at the date of death was a truck driver.

CIRCUMSTANCES SURROUNDING THE DEATH:

On Sunday, 13 July 2014 after sleeping in until approximately midday, Mr Carver had lunch with his family at their home and then spent time with his family, playing with his children at a local park. After returning home he had his evening meal at about 6:00pm, got ready to go to work, and after helping his wife prepare their children for bed he left for work.

He commenced work at 7:15pm at his employer's depot (De Bruyns Transport) at Gormanston Road, Moonah. He left the depot at 7:36pm driving a Mack Trident Prime Mover registration number C97JY which was towing a Tieman Fish Tanker registered number Z46PO. Mr Carver has driven this vehicle to Port Huon, arriving at approximately 8:30pm and the tanker was loaded with approximately 4,000 litres of ice slurry. He then left Port Huon and travelled to Hideaway Bay leaving at approximately 9:00pm. He arrived at Hideaway Bay at 9:24pm and positioned the Prime Mover and Tanker in order to allow it to be loaded with fish. He has then gone to the crib room to await the loading of his vehicle at which time he spoke to a fellow driver, Mr Leon Fewkes. Mr Fewkes reports that Mr Carver was relaxed and appeared to be in a good frame of mind and they discussed general family matters. Mr Fewkes asked Mr Carver what time he had to be back and his reply was "a couple of hours" which means he had plenty of time to perform his delivery task.

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website: www.magistratescourt.tas.gov.au

Mr Carver has left Hideaway Bay with his load at 11:08pm and began travelling back to Port Huon. The police investigation has determined that Mr Carver has driven a distance of approximately 4km north-bound along Esperance Coast Road at which point he was driving down a slight incline and has commenced to negotiate a closed left-hand curve. The trailer has started to move out to the right-hand side of the corner and has gone over an embankment on the eastern side of the road with the weight and rotation of the trailer causing the Prime Mover to flip onto the driver's side. The truck and trailer have slid down the embankment with the cabin striking an Aurora power pole and trees, roof first. The truck and trailer have come to rest in close proximity to one another approximately 15m down the embankment.

Phillip Holland, a fellow driver, had arrived at the Port Huon yard at around 11:00pm, hooked up a trailer and put ice slurry in and left the yard at approximately 11:07pm. In the course of his journey towards Esperance Coast Road, he had attempted via his UHF radio to contact Mr Carver as, in normal course, he would pass his truck coming in the other direction on the Esperance Coast Road. Such contact was the normal course in order that both drivers could prepare to pass safely when they met on Esperance Coast Road. Mr Holland was unable to contact Mr Carver and proceeded along Esperance Coast Road with his speed reduced as he did not know where the other vehicle, being driven by Mr Carver was, on the roadway. As he rounded a right-hand corner before the accident scene, he could see truck lights but it was not until he arrived at the scene that he realised the truck had been involved in an accident and was located down the embankment. He immediately called the fish farm and informed them of this, requesting that ambulance, police and SES be notified. He thereafter went down to the damaged truck and called out for Mr Carver as he was unaware of whether he was in the vehicle or had been thrown clear. He then located Mr Carver, seated in the vehicle, but could not gain access to him nor could he get any response from him. A number of persons from the fish farm attended the scene and attempted to gain access to the vehicle to get Mr Carver out but without success.

Police officers arrived at the scene at about 11:55pm. 1/C Constable Silk noted that the rear window of the Prime Mover had come out and he could see the left side of the driver in his seat, pinned by the roof of the truck. He attempted to find a pulse by checking the driver's neck and left wrist but could not find one. He then looked through the driver's window and observed that Mr Carver's eyes and mouth were open and there appeared to be no signs of life. He noted that Mr Carver was facing to the right as the roof was pressing down on the left side of his face and head and the roof had also compressed onto his chest area. A Tasmanian Fire Brigade unit arrived at the scene and fire officers and SES personnel took steps to disconnect the vehicle battery as it was noted fuel was leaking from the driver's side fuel tank. Ambulance personnel arrived at the scene at 12:10am and the attending ambulance officer confirmed that Mr Carver was deceased.

Attending police identified the extent of the crash scene and secured that area with Tasmanian Police Forensic Services and the Crash Investigation Service officers arriving later to commence a formal investigation of the accident.

The post-mortem identified that Mr Carver had marked congestion of the upper chest, face and head but only superficial injuries of the face and body. There was congestion of the eyes and scatter petechiae on the lower eyelids. Copious food debris was located within the airways. Fatal traumatic injuries were not identified externally or internally; however aspirated food was identified in the lungs. The conclusion from these findings were that Mr

Carver had succumbed to traumatic/positional asphyxia that occurred when the roof of the cab of the truck was compressed onto his upper body when it rolled down the embankment. The position of the head and airway prevented normal respirations leading to death by asphyxia.

When the roof cabin was removed to allow Mr Carver to be extricated from the vehicle he was sitting in his normal driving position with his seatbelt on. His right and left hands were positioned as if they had still been on the steering wheel when it came to rest. There was no indication that he had made any attempt at moving his position after the crash which indicates that he was unconscious after impact.

COMMENTS AND RECOMMENDATIONS:

This tragic accident was the subject of a detailed police investigation, the findings of which I adopt. The road markings at the scene allow for a reconstruction to be made as to how this tragic event unfolded. As the vehicle progressed through the left-hand corner, the rear driver's side of the trailer has moved off the roadway causing the instability that initiated the trailer and Prime Mover to flip onto the driver's side. The vehicle has then slid along the roadway but the trailer has proceeded off the roadway sliding both Prime Mover and trailer down the embankment to where it came to rest when it struck trees. The Prime Mover and trailer have broken free and the Prime Mover has landed on its wheels after colliding with trees. There is no evidence to indicate that the Prime Mover or the tanker rolled multiple times.

The corner being traversed by Mr Carver at the time of the accident has been shown to have two apexes to be negotiated. The critical curve speed of the first apex was determined at 60km/h, however the second apex had a critical curve speed determined at 48km/h. The roadway at this point has the default open road speed limit of 100km/h. Mr Carver has clearly been under the critical curve speed of 60km/h for the first apex and an estimation of the truck speed at the second apex was 47km/h. Mr Carver has got into difficulties as the Prime Mover has commenced to negotiate the second apex.

The rollover threshold for the Prime Mover at this second apex was calculated in accordance with accepted scientific formula to arrive at a speed of 43km/h for rollover. The speed of the Prime Mover could possibly have been 4km/h over the rollover threshold taking into account the approximation of calculations. The rollover threshold does take into account that a tanker was attached but does not take into account the nature of the load consisting of fluid/slurry which, upon cornering, would cause sloshing of the load from side to side and allow a surge of the load from front to rear and vice versa. It is concluded that the likely effect of slosh and surge would have increased the vehicle's propensity to roll.

It is clear that the open chamber with a moving load created the additional uncertainty of the effects of surge and sloshing. I recommend that some consideration be given to inserting some form of baffle, at least transversely, in order to minimise these effects.

Mr Carver's vehicle was fitted with an Electronic Braking System (EBS) which utilises electronics to control a vehicles braking system. EBS enables communication between towing and towed vehicles with regard to axle braking loads, wheel speeds and deceleration, and can be combined with other systems to provide roll stability assistance to trailers. The EBS on this occasion did not record an instability event prior to the corner or even through

the corner. The first record of the EBS activating was when the right-hand wheels were hovering above the embankment. The logging of this event would indicate that the EBS was working; however it did not record a disturbance significant enough to activate the system prior to the corner at the commencement of the tyre marks found on the roadway.

The tanker involved in the crash was a single compartment tanker. Due to the liquid and fish being transported which were an average of 5kg each and between 71cm and 76cm in length it was not possible to compartmentalise the tank. It is accepted that the tanker complied with applicable Australian design rules. However, the single compartment design does allow for the slosh and surge of the load within the tank which can be unpredictable and can influence the stability of the trailer.

Mr Carver had been driving this "fish run" for a period of approximately 7 months. This equates to 35 weeks, 5 nights per week, with two runs per night. An analysis of his trip logs indicates that his average time to exit Esperance Coast Road was 29 minutes. His fastest time to exit was 28 minutes and the slowest time, 32 minutes. This analysis was conducted utilising six trips. Times in the vicinity of 30 minutes are considered slow by the employer. Mr Fewkes had been driving the fish run for 3 years and he indicated that his average time to exit Hideaway Bay was between 22 and 25 minutes. There is no evidence to suggest that on this occasion, or on any other occasion, Mr Carver's speed exiting Hideaway Bay was inappropriate or excessive. At the conclusion of the investigation, Senior Constable Kelly Cordwell of Crash Investigation Services summarises the contributing factors to this tragic accident as follows:

> "*There are several contributing factors in this collision; namely the curve of the corner, the downhill nature of the curve, the steep embankment, lack of safety rails and lack of speed warning signs prior to the corner.*
>
> *The load of fish and slurry was unique to this trip as is every load, as such its exact behaviour could not have been known to Mr Carver prior to embarking on the trip. The liquid load has been forced forward (surge) and has been sloshing (side to side) therefore forcing all the weight to the right front portion of the tanker. This is evident from the tyre marks left by the right hand side of the prime mover as it entered the corner. The speed of the prime mover was calculated at 47km/h. This speed was before the second apex which had a critical curve speed of 48km/h.*
>
> *The rollover threshold of the prime mover was calculated at 43km/h. Mr Carver has been travelling 4km above this limit at a speed of 47km/h.*
>
> *The critical curve speed of 48km/h and the rollover speed of 43km/h would not have been known to Mr Carver. Drivers rely on how a load feels in order to select an appropriate speed to negotiate a corner.*"

Senior Constable Cordwell refers to a report on milk tanker rollovers that was conducted by Arnold Dicks on behalf of the Gardner Foundation and Murray Goulburn Cooperative Company Limited dated 30 September 2008. This concluded that the difference between the "safe" speed and the rollover threshold for a truck may be as little as 10km/h. This means that a minor underestimation by the driver on a bend can lead to a rollover. It also noted that drivers could not know in advance of a rollover at exactly what speed a partially loaded milk tanker might roll over on a bend because there are too many variables at work.

It is also noted that the truck being driven by Mr Carver was fitted with airbag suspension. Although this style of suspension is stable, more comfortable to ride upon and less damaging to roads than trucks with conventional leaf style suspension, airbag suspension does divorce the driver from the feel of the road. Drivers of trucks with airbag suspension report that they have less "feel" about road surface, camber and cornering progress as this is dampened through the airbags providing the driver with a more insulated driving experience.

Although scientific assessment has concluded by estimating the speed being driven by Mr Carver immediately before the accident, and that this speed was slightly above the safe speed before rollover, there is no way that Mr Carver would have been aware of this and these factors influencing the safe speed would have changed from trip to trip and from load to load. The calculations are altered by a driver taking a different line through a corner and also by the behaviour of the load dependent upon weight and the degree of surge and slosh. There is no indication that Mr Carver would have been aware as to the likely risk of rollover on this occasion or that he was driving in other than an appropriate manner for the circumstances as he believed them to be at the time.

I am advised that since this accident the shoulder of the road at the scene of the accident has been extended and six guide posts have been placed around the curve giving a better indication of the severity of the corner. In addition a 35km/h advisory sign has been erected at that corner. These steps will no doubt assist in reducing the likelihood of a similar accident in the future.

It is of concern, however, to note that in the period 2013-2014 there were 38 heavy vehicle rollovers involving vehicles above 20 tonnes in Tasmania, not including this incident. Four of these were deemed serious, ten were minor injuries, ten required first aid only and 14 involved vehicle damage only. The police investigation notes Driver Safety Services conducts a course on rollover prevention in Tasmania. This course is produced by a Victorian public authority and includes a DVD and Powerpoint presentation. It is my recommendation that this specific training in rollover prevention be a requirement for all persons licensed to drive heavy rigid vehicles which are exposed to the risk of rollover. In this regard I am advised that the Victorian forestry industry suffered, on average, 16 log truck rollovers every 6 months prior to this particular course being developed and delivered. In the 6 months following the introduction of the training the industry recorded no rollovers. The risk of rollovers in certain circumstances and with particular loads is obviously significant and this training will clearly help to alert drivers to this risk and to mitigate the likelihood of such events.

In conclusion, I convey my sincere condolences to the family of Mr Carver.

DATED: 8 October 2015 at Hobart in the State of Tasmania.

Stephen Carey
CORONER