QUEENSLAND COURTS

OFFICE OF THE STATE CORONER

FINDING OF INQUEST

CITATION:	Inquest into the deaths of Malcolm MACKENZIE, Graham Peter BROWN and Robert WILSON
TITLE OF COURT:	Coroner's Court
JURISDICTION:	Rockhampton
FILE NOS:	2005/31; 2005/32; 2007/147
DELIVERED ON:	23 February 2011
DELIVERED AT:	Rockhampton
HEARING DATES:	09/05/2007; 20/08/2007; 11/07/2007; 21-24/08/2007; 10-14/03/2008; 17-20/03/2008; 25-28/03/2008; 02-03/06/2008; 05-06/06/2008; 28-31/07/2008; 01/08/2008; 11-14/08/2008; 20-21/11/2008
FINDINGS OF:	Ms Annette Hennessy, Coroner
CATCHWORDS:	Fatal motor vehicle collisions occurring after drivers completed shift at mines in Bowen Basin; Fatigue in drivers; Commuting to mine sites; Policing of Fatigue Driving.

REPRESENTATION:

Counsel Assisting:	Mr John Tate, Crown Law
MacKenzie Family:	Mr J Houlihan, Rees R & Sydney Jones
Wilson Family:	Mr Ken Bressington, Bressington & Partners

Other Appearances:

CFMEU:	Mr G O'Driscoll instructed by Hall Payne Lawyers
BHP Coal Pty Ltd BM Alliance Coal Operations Pty Ltd:	Mr J Murdoch SC & Mr A McLean-Williams inst/by Sparke Helmore Solicitors
Qld Resources Council:	Ms E Wilson instructed by Gadens Lawyers
Commissioner of Police:	Mr J Owen & Mr G Obst, Office of the QPS Solicitor

1. These findings seek to explain, as far as possible, how the two motor vehicle incidents occurred in which Malcolm MacKenzie, Graham Brown and Robert Wilson died.

2. Senior Constable MacKenzie and Mr Graham Brown died in a two vehicle accident on Yeppoon - Rockhampton Road, Mulara, on the evening of 24th October 2005. Mr Brown worked at Blackwater Mine and was travelling to his home at Yeppoon when the accident occurred. He had worked a roster of four day shifts and had completed a day's work before driving a little over two hours home. It is thought possible that he was fatigued as a result of his work during the drive home. Senior Constable MacKenzie was driving to work at the North Rockhampton Police Station from his home in Yeppoon with a colleague, Constable Michael Koellner. A tropical storm passed through the area of the accident around the time of the collision. Mr Brown's vehicle collided with that of the Police Officers and the two men were killed instantly. The cause of the collision and the location of the impact point are the subject of contest in the evidence.

3. Mr Robert Wilson died in a two vehicle accident on Dysart-Middlemount Road, Dysart on the morning of 1st February, 2007. Mr Wilson worked at the Norwich Park Mine and had worked a night shift. He left the mine site in his car at the end of his shift. Some of his colleagues later described him as being very tired at the time. During the 30 minute journey to his accommodation in Dysart, Mr Wilson's vehicle passed onto the incorrect side of the road and collided with an oncoming vehicle driven by Ms Katie Harrold. Ms Harrold was on her way to work in the administration offices at the same mine at the time of the collision. She was not seriously injured but Mr Wilson died instantly from his injuries. There were no weather conditions affecting the area at the time and the cause of the collision is to be determined. Possible fatigue of Mr Wilson and the condition of the road is in issue as a potential causative factor in the collision.

4. A Coroner is required under s45(2) of the Act when investigating a death, to find, if possible: the identity of the deceased, how, when and where the death occurred, and what caused the death. The focus of an Inquest is on discovering what happened, informing the family and the public as to how the death occurred, but not on attributing blame or liability to any particular person or entity.

5. The Coroner also has a responsibility to examine the evidence with a view to reducing the likelihood of similar deaths. Section 46(1) of the Act, authorises a coroner to "*comment on anything connected with a death investigated at an inquest that relates to – (c) ways to prevent deaths from happening in similar circumstances in the future."* Further, the Act prohibits findings or comments including any statement that a person is guilty of an offence or civilly liable for something.

6. Due to the proceedings in a Coroner's court being by way of inquiry rather than trial, and being focused on fact finding rather than attributing guilt, the Act provides that the Court may inform itself in any appropriate way (section 37) and is not bound by the rules of evidence. The rules of natural justice and procedural fairness apply in an Inquest. The civil standard of proof, the balance of probabilities, is applied. The State Coroner outlined the correct approach in his decision on the Lockhart River Inquest at page 5:

> *A Coroner should apply the civil standard of proof, namely the balance of probabilities, but the approach referred to in the Briginshaw sliding scale is applicable. This means that the more significant the issue to be determined, the more serious an allegation or the more inherently unlikely an occurrence, the clearer and more persuasive the evidence needed for the trial of fact to be sufficiently satisfied that it has been proven to the civil standard.*

7. All interested parties can be given leave to appear, examine witnesses and be heard in relation to the issues in order to ensure compliance with the rules of natural justice. In this matter, the employer of Messrs Wilson and Brown - BMA, Queensland Police Service (QPS), Queensland Resources Council, the CFMEU and the family of Snr Const MacKenzie were represented at the Inquest.

8. All of the evidence presented during the course of the Inquest, exhibits tendered and submissions made, have been thoroughly considered even though all matters may not be specifically commented upon. Consequent on the court hearing the evidence in this matter where learnings can be made to improve safety, changes to departmental, company and/or industry practice may be recommended with a view to reducing the likelihood of similar incidents occurring in future.

9. The issues for determination in this Inquest are:

A. How did each of the motor vehicle collisions occur?
B. What were the causes of and/or contributing factors to the collisions occurring and to what extent, if any, was fatigue a contributory factor?
C. What are the formal findings?
D. Are there any matters connected with any of the deaths in which there can be improvements to public safety by changes in policy or procedure, including in relation to shift work and commuting which might avoid deaths occurring in similar circumstances in the future?

The Yeppoon Road Accident

A. How did the motor vehicle collision occur?

10. The collision on the Yeppoon Road was investigated by a Police Officer, Sgt Price, who was an experienced officer, trained in the investigation of traffic collisions. Such training was referred to as Traffic Accident Investigation Squad (TAIS) training, the current terminology is Forensic Crash Unit (FCU). Sgt Price was a colleague

and close friend of Senior Constable MacKenzie. QPS determined that Sgt Price was the only officer with the requisite training available on that evening to investigate the matter. Due to the weather conditions and potential adverse impact on evidence at the scene, there was no time for an officer to travel from another district to investigate the collision. There was challenge at the Inquest by BMA as to whether the conclusions drawn by Sgt Price as to the nature and cause of the collision were correct. BMA called evidence from two expert witnesses, Mr Foessel and Dr Grigg, with regard to this challenge. Some criticism of the officer based in part on his personal relationship with one of the victims of the crash.

(i) Police Investigation

11. Sergeant Price had 18 years of police service at the time of the Inquest. He had completed the basic Accident Investigation Course at the Queensland Police Academy in 1993 and a survey mapping course in crash scenes in 2005. He completed the Advanced Accident Investigation Course in 2006 and the Collision Analyst Course also in that year. He completed the VERICON Training Course in 2007 in relation to the use of VERICON computer programs. He had been involved in investigating serious and fatal crashes including industrial accidents on a part-time basis since 1993 and full-time since 2006. During that time, the officer had been involved in excess of 150 fatal and serious traffic crash investigations.

12. Sergeant Price prepared a report in relation to his investigation of the incident which was dated the 5th of May 2006 (Exhibit 7). Sergeant Price's report stated that the motor vehicle collision occurred on Monday the 24th of October 2005 at about 9.30 pm. It was a two vehicle traffic crash on the Rockhampton/Yeppoon Road near the intersection with Mulara Road. Sergeant Price was aware that at the time of the crash a severe tropical storm had passed over the area.

13. Two vehicles were involved in the traffic accident, a yellow Mitsubishi Pajero, a short wheel-based four wheel drive, with Queensland registration 660-HBN, driven by Graham Peter Brown. The second vehicle was an orange Mazda2 Hatchback, Queensland registration 998-IFS, which was driven by Senior Constable MacKenzie with a front seat passenger, Constable Michael Koellner.

14. Prior to the incident, the Mazda containing Senior Constable MacKenzie and Constable Koellner had been travelling in a westerly direction towards Rockhampton and Mr Brown in the Pajero had been travelling in an easterly direction towards Yeppoon. The roadway was one lane in each direction divided by a broken white line and a continuous line. Vehicles travelling from Rockhampton to Yeppoon, in the direction that Mr Brown was travelling, travelled along a straight section of road before coming up over a rise. The intersection of Mulara Road is situated at the top of the rise. Once past that point, a vehicle travelling in that direction would continue straight for a short

distance before entering into a sweeping bend. The collision occurred on a fairly straight section of road with a slight grade. There was no street lighting at the scene.

15. Constable Koellner was the only eyewitness to the collision and the only survivor of the accident. He was unable to give evidence at the Inquest for medical reasons but his statement was admitted and has weight as the only direct evidence of the incident, though untested. He had some minor and short term memory loss immediately following the incident but was able to provide a statement to Police in the days following.

16. Constable Koellner stated that visibility was good, the windows were clear, the windscreen wipers were working and the air-conditioning was on. Snr Const MacKenzie was travelling in the centre of the lane. Const Koellner recalls that as they approached the intersection with Mulara Road, he saw the headlights of an oncoming vehicle travelling at about 80 km per hour. When the vehicle was approximately 30 metres away, it veered sharply into the incorrect lane. Snr Const MacKenzie yelled something out and braked heavily. The other vehicle appeared to maintain its speed. Immediately prior to the impact, the headlights of the other vehicle were shining straight at them through the windscreen.

17. The first person on scene was Ms Wright who called emergency services. She had been dining with a friend in Rockhampton who urged her not to drive home to Yeppoon because of the storm. Ms Wright did drive home, however, through rain and water on the road. She needed her headlights on high beam in order to maintain visibility.

18. On Police arrival at the scene, the Mazda was facing in an easterly direction just off the west-bound lane and the Pajero was facing in a westerly direction on the east-bound lane. Both vehicles were extensively damaged. The Pajero suffered extensive front end damage to the bull bar and to the front passenger and driver's side. There were also markings on the front of the vehicle indicating the collision with the orange vehicle the Mazda. The Mazda also suffered extensive damage to the front end resulting in the front end of the vehicle collapsing and sitting on the road. Due to the extensive damage to the front of both vehicles, Sergeant Price was unable to determine whether the lights of either were on high beam at the time of the incident.

19. Sergeant Price inspected the surface of the road and located a single gouge mark in the road in the west-bound lane (towards Rockhampton). There were no other signs or marks on the road that could be located on that evening. From inspection of the vehicles and the roadway, Sergeant Price drew the conclusion that the gouge mark represented the **point of impact** between the two vehicles at which point the front end of the smaller car, the Mazda, was forced onto the

road surface. Sergeant Price stated that the middle area of the bull bar of the Pajero has impacted with the front driver's side of the Mazda at the initial point of impact. The front end of the Mazda vehicle appeared to have travelled underneath the bull bar of the Pajero. The point of impact was also determined due to the existence of fluid appearing to be radiator fluid, brake fluid and/or engine oil on the roadway near the gouge mark. The Sergeant considered that from the point of impact, which was 50 - 100 metres away from the bend, the Pajero had spun the Mazda, which was smaller and lighter, around into its resting place and the Pajero had spun in the other direction backwards to where it had come to rest. The length of the gouge mark was approximately half a metre which would represent the distance over which the front of the Mazda was driven into the road surface before the downward force was released. The only mark on the road was the gouge mark and tyre marks were expected to be less likely due to the wet surface of the road at the time of the incident.

20. From the evidence that Sergeant Price saw on the road and on the vehicles, he concluded that the collision had occurred in the centre of the west-bound lane, that is, between the centre line and the fog line. Those investigations suggested that the Pajero was on the incorrect side of the road at the time of the collision.

21. The section of road on which the accident occurred was redesigned months after the crash for the installation of a new intersection a short distance away and the area was upgraded. Sergeant Price advised that it had been planned for an upgrade prior to the crash and that proceeded after this incident. This upgrade included a turning lane a short distance from the incident which included a painted narrow traffic island in the centre of the road way in this vicinity.

B. What were the contributing factors to the collision occurring and what extent, if any, was fatigue a contributory factor?

22. Sergeant Price was of the opinion that the **severe tropical storm** which had passed through the area around the time of the incident may have been a contributing factor in the collision. He obtained evidence from the Bureau of Meteorology confirming the presence of the storm which travelled in a north-westerly direction with wind gusts between 8 and 24km per hour and heavy rainfall. The driver of Rockhampton Queensland Fire and Rescue Service Unit on its way to the collision from Rockhampton stated that he was having great difficulty in controlling the vehicle due to the very high wind and visibility was very poor due to heavy rain and debris from the trees. Sergeant Price commented that in his opinion the smaller, lighter vehicle would have been affected by the wind gusts more so than the heavier, larger Pajero. Due to the particulars of the site of the collision as identified by Sergeant Price, he felt that wind would not have been a significant contributing factor to the collision.

23. The issue of **bad visibility** from the Pajero may have played a role. Sergeant Price was unable to tell due to the damage of the Pajero whether the internal demister or heater was engaged at the time of the accident. The driver's window of the Pajero was down on Sergeant Price's arrival at the accident but he was unable to say whether it was up or down prior to the crash. He did however comment after viewing the photographs that it appeared that the window may have been smashed during the incident. All other windows were intact.

24. It was postulated by BMA that the Pajero could have aqua-planed on any **built up water** on the road. Sgt Price did not see any signs of water pooling and considered that the gradient of the road would cause water to run off the surface. The tyres of each vehicle were inspected and were considered to have had sufficient tread depth. Sergeant Price however conceded that looking at photograph 18, there appeared to be an area in the lane of Mr Brown's travel where a substance put onto the road by QFRS to absorb oil and fluids had settled into a rut in the bitumen surface. Sergeant Price categorised this as a minor defect in the asphalt and did not consider that it made any contribution to the collision. This "rut" led up to the point which Sergeant Price had identified as the point of impact. The Sergeant agreed that it was possible that during a tropical down pour on a road surface which had at least one if not more depressions on it that the water running from the crown of the road to the sides as well as water pooling in the depressions that had formed in the roadway due to wear and tear may have occurred.

25. As both drivers were shift workers and one of them had worked a long shift before the collision, an examination was made in relation to **whether either driver may have been fatigued** at the time of the collision.

26. Senior Constable MacKenzie was 43 years old. He was mentally and physically fit but suffered from gastric oesophageal reflux for which he received medical treatment. His doctor gave evidence that Snr. Const. MacKenzie experienced some difficulties with the transition from night duty to day duty and in resuming a regular sleep pattern. He was prescribed sleeping tablets but was not taking them on a regular basis. He occasionally had insomnia due to difficulties in switching off from work. Snr. Const. MacKenzie also had a history of depression and was medicated every third day. Snr Const MacKenzie was said by his doctor to be coping well with his "high stress" police duties and his depression did not interfere with his ability to work or drive a vehicle. While rostered on night shift, Snr. Const. MacKenzie had a stable sleep regime and did not do any additional jobs around the house during non-shift hours and would relax. He had a good eating regime and slept until lunch and again after an early dinner, waking at 9pm to get ready for his night shift. His roster was in accordance with the Qld Police Service Award.

27. Const Koellner who travelled with Snr Const MacKenzie, stated in his statement that the Snr Const was never in a hurry and always drove safely and did not exceed the speed limit. The Snr Const was "fine" when he arrived to collect Const Koellner. The men were in constant conversation while driving and, whilst the weather was stormy, it was not affecting Snr Const MacKenzie's driving.

28. Senior Constable MacKenzie was found to have a blood alcohol reading of 15 milligrams alcohol per 100 millilitres of blood which represents a .015% blood alcohol concentration, which the medical evidence suggests could have developed in his blood after death and was therefore not a factor in the causation of the collision. He was, at the time, on his way to work with Constable Koellner. An analysis of the shift rosters and information gathered from Mrs MacKenzie did not produce any evidence to indicate to Sgt Price that Senior Constable MacKenzie was fatigued at the time of the collision.

29. A similar enquiry was made by Police regarding Mr Brown's movements prior to the collision. Mr Brown was a 54 year old man in ordinary good health. He divided his time between his place of residence in Yeppoon where he resided with his defacto wife, Ms Hillier, and his employment at Blackwater Mine. Mr Brown had just finished a roster of shifts at Blackwater and was returning home to Yeppoon on the night of the collision. A Sergeant who had attended on the next-of-kin of Mr Brown to advise of the fatality, was informed by Ms Hillier that Mr Brown mentioned to her in a phone call the night before that he was tired and she advised him that if he was feeling tired that she should stay in Blackwater after work and not drive home until the following day. Similar comments were made by Ms Hillier to Mr Keech, a friend of Mr Brown's, though no timeframe was mentioned to him. Ms Hillier later would not comment on this conversation when giving her Police statement.

30. Mr Brown was employed by a contractor to BMA, CE Marshall and Sons. Mr Brown worked a four day roster, four days on/ four days off, and alternated between night shift and day shift. When not on roster, Mr Brown spent his time quietly in Yeppoon with his partner. When at Blackwater, he shared the downstairs area of a house with a colleague, Peter Persson. The men did not consume alcohol while on roster and had stable eating and sleeping habits. In the four day period before the accident, Mr Brown was in the accommodation alone.

31. Mr Brown had commenced his shift at 5.30 am on the 24th of October 2005 and had signed off his timesheet at 6.30 pm that evening, a 13 hour period. The shift length was ten and a half hours maximum driving time of the machine. On the day in question he worked about ten hours driving. Mr Brown left Blackwater at 5.10am. The collision occurred approximately 18 hours later at 9.20pm.

32. Mr Brown's duties involved driving a large dump truck removing overburden on the mine site. Mr Persson stated that this was a very comfortable job as the trucks had good amenities. There were also opportunities for drivers to get out of the cab and walk about and drivers were able to "park up" and rest if they were tired. Mr Brown underwent fatigue awareness training at work in August 2005. Mr Persson, who usually travelled to and from Yeppoon with Mr Brown, stated that they would alternate the driving and Mr Brown was a very careful driver who did not take risks.

33. On the day in question, Mr Brown collected Mr Korn, a co-worker, in Blackwater at 5.10am and drove to the hardstand to commence at 5.30am. They then left the hardstand at Blackwater Mine and travelled by bus for about 1 hour to the worksite at Ramp 84.

34. The air-conditioning in Mr Brown's caterpillar truck was not operating as there had been some malfunction which had not yet been repaired. Mr Brown told his supervisor that there was not a problem for him in relation to the operation of the air-conditioner. The day was a hot, humid day (30.7 degrees in Blackwater).

35. It was estimated by the employer from the Load Record Sheet that Mr Brown had up to a 56 minute break from driving during his last shift. There was opportunity for Mr Brown to sleep on the bus ride from the hard stand to the ramp on site at the commencement and conclusion of the shift but no evidence as to whether this opportunity was taken up. There was no evidence from co-workers that Mr Brown was showing any signs of fatigue during the shift.

36. Mr Brown was accompanied on most of the drive back to Yeppoon by Darren Korn. The travelling time from Blackwater to Yeppoon was a little over two hours. Mr Korn stated that it was "pretty much like any other trip". After they got back to the hard stand in the afternoon they had a bit of a wash, a chat, and something to eat at the BBQ (supplied by the employer to refresh workers before travel), said good bye to people they worked with, hopped in the car and left. During the journey they discussed their families and what they were going to do on their day off. They talked most of the way home. Just before reaching Duaringa (90 km west of Rockhampton), Mr Brown said he was feeling tired. They stopped for a rest break at Duaringa for ten to fifteen minutes. Mr Korn offered to drive but Mr Brown declined. Mr Korn had no concerns about Mr Brown's driving. Mr Brown dropped Mr Korn to the DPI corner at Rockhampton and waited there with him for about ten minutes for Mr Korn's partner to collect him. Mr Brown got out of the car and walked around and had a cigarette. After Mr Korn left with his partner, Mr Brown continued the journey to Yeppoon. During that journey, the collision occurred.

(ii) Police Conclusion as to cause of the collision

37. Sergeant Price confirmed that it's very difficult to isolate the nature and cause of a motor vehicle crash where the driver is unable to provide a statement about what actually happened. He based his conclusions as to the causative factors of the accident on the conditions of the road, the weather conditions at the time of the incident, the evidence that was on the roadway, the resting positions and damage to each of the vehicles, information from witnesses and the information given to him from police about Mr Brown's conversation with Ms Hillier.

38. Sergeant Price concluded that the incident occurred when Mr Brown's vehicle veered onto the incorrect side of the road for an unexplained reason and collided with Senior Constable MacKenzie's vehicle. There were no signs of evasive action from either vehicle and an absence of any tyre marks or other marks on the road apart from the gouge mark. Sergeant Price also based his opinion on the report of potential tiredness on Mr Brown's part from his next-of-kin and the evidence from Mr Korn in relation to Mr Brown's comments in the vehicle, rest stops and evidence in relation to his time at work prior to the collision.

39. Sergeant Price concluded in his report that a major contributing factor to the accident was the fatigue of Mr Brown but the actual causes as to why the Pajero had crossed onto the wrong side of the road could not be determined. Sergeant Price considered that another contributing factor to the incident was the weather, potential momentary inattention by Mr Brown, and potential target fixation of Mr Brown on the oncoming headlights.

40. BMA contend that the Police prematurely terminated investigations into other causes of the collision, settling on fatigue early in the investigation as a result of Ms Hillier's statement about the tiredness, Mr Brown wearing work clothes and his vehicle being found in the incorrect lane after the collision. I do not accept this contention and I consider that it is clear on the evidence that Sgt Price fully investigated the collision and did not avoid investigating any element of the collision based on an early conclusion as to the cause. Evidence was called by BMA from two expert witnesses to contest some conclusions drawn by Sgt Price.

(iii) Opinion of Mr Foessel

41. Mr George Foessel from Motor School Driver Training Specialists was commissioned by BMA to prepare a report regarding the collision. Mr Foessel is a former Queensland Police Officer and police driving instructor of 16 years experience. He investigated many hundreds of traffic and transport incidents which included investigation of non-fatal training related police accidents. Mr Foessel is experienced in relation to the handling and driving of vehicles (in particular four wheel drives).

42. The CFMEU raised objection to Mr Foessel's evidence being received as expert evidence on the basis of his lack of formal qualifications in

the area. It is clear from Mr Foessel's background and employment that he has extensive experience in road crash investigations as a Police Officer some years ago. Mr Foessel's evidence has also been received in other coronial hearings. His evidence is admissible as expert evidence and should be weighed in light of the extent of his expertise and its relevance to the issue being opined on. For example, the opinions related to the likely effect of the wind gusts on the movement of the Pajero are speculative, although experience-based to some extent, and given a lack of formal qualifications relating to the effects on the movement of that vehicle in those conditions, of limited weight.

43. Mr Foessel acknowledged in his report that the QPS officers concerned with investigating the collision would have encountered difficult circumstances, particularly the weather conditions, which tend to hamper efforts to gather appropriate evidence.

44. Mr Foessel considered that there were a number of possible contributing factors to the collision with **strong winds and heavy rain as a major contributing factor** "over and above" fatigue. Mr Foessel was particularly influenced by statements from witnesses who were driving on the road on that night who needed to reduce the speed at which their vehicle was travelling in order to maintain visibility (due to heavy rain) and control of the vehicle (due to high winds). Those witnesses included the driver of the fire engine, a Yeppoon Police Constable who attended the accident and Ms Nicholls who was driving Mr Korn home ahead of Mr Brown. He also thought that due to the configuration and gradient of the road that either driver may have been dazzled by the high beam lights of an oncoming vehicle.

45. Mr Foessel felt that the most prominent effects of the weather conditions on Mr Brown's driving were likely to have been an affect on **visibility** due to heavy rain and poor ventilation within the Pajero. He also considered that the Pajero may have been affected by **strong winds** on the evening due to its large size and poor aerodynamic characteristics. Mr Foessel opined that the short wheel based Pajero had quite a square shape and was a very susceptible vehicle when driving in strong winds. The particular vehicle Mr Brown was driving was the last model with that shape. He detailed how the configuration and size of the vehicle made it more likely than the newer, smaller Mazda to be influenced by high winds.

46. Mr Foessel concluded that Mr Brown "*would have had to have a higher level of concentration to safely operate the vehicle in such severe weather conditions. I think that his vehicle's general handling characteristics combined with the strong winds would have made the task of keeping the vehicle entirely within the marked lane during the heavy winds quite a challenge*" (Paragraph 34 of report).

47. On his review of the witness statements as to Mr Brown's condition during the drive home, Mr Foessel concluded that **fatigue** on the part of Mr Brown would be extremely unlikely as a possible cause for the collision. Mr Foessel conceded, however, that there was nothing in the evidence in relation to the accident that excluded fatigue as a causative factor of the accident.

(iv) Opinion of Dr Frank Grigg

48. Doctor Frank Grigg, a Consulting Mechanical Engineer with the firm Forensic Engineering Consulting, was commissioned by BMA to analyse the Yeppoon Road collision. Mr Grigg has conducted over 1,000 motor vehicle accident investigations and 2,500 forensic investigations, including around 100 accidents involving fatalities.

49. Doctor Grigg prepared a report dated the 11th of December 2007 in relation to his investigations. In order to obtain a better understanding of the way in which the collision occurred, Doctor Grigg conducted a computer simulation based on data drawing on the police photographs, the specifications of the vehicles involved in the incident, details of the roadway and the position, nature and extent of the damage to the vehicles. The simulation program determines how the vehicles came to be at their positions of rest by making a computation which attempts to determine the motion of the vehicles during the collision. Variables such as the speed of each vehicle, their position and orientation of the vehicles before the collision occurred were unknown with any certainty, and, in effect, the computer program estimated those factors and changed the values of those factors on a number of iterations which were performed during the simulation. There are about six or seven variables in all that can be changed and the computer tries different values of each of these, until the result has the vehicles ending up in the positions which they were in at after the collision. A coefficient of friction was added to estimate the friction factor for the wet road on the night of the collision.

50. The simulation had a trajectory error of 1.6. Dr Grigg stated (p20 transcript 27/3/08) that this trajectory error figure gave him a "*high level of confidence that the answer is pretty close to correct…that these sorts of collisions are quite complicated and simply there's too many things to take everything into account with absolute certainty by any means. But this indicates a high level of confidence to me*." The vehicles spun around following impact and left no marks on the road. The distance that they travelled after impact was not large. This situation made matching of the simulation to the reality less optimal.

51. The computer simulation showed the Pajero was completely in the westbound lane at the point of impact. Results also showed that the vehicles' speeds at impact were approximately 70 kph for the Pajero and 71 kph for the Mazda. The speeds were estimates within a range and their accuracy depends to some extent on the friction the vehicles experienced based on the amount of water on the road and the extent

of the tyres grip on the road for each vehicle. No tests were done on the coefficient of friction; the estimate used was based on Dr Grigg's experience of previous investigations.

52. Doctor Grigg stated at paragraph 9 on page 5 of his report "*there is no evidence that could be used to predict the movements of the vehicles as they approached the point of impact, except that the orientation of the vehicles at impact suggests that the Pajero was moving from a position on the wrong side of the road back towards its correct side and the Mazda was swerving from close to or over the centre line towards the left hand side of its lane*." During cross-examination, Dr Grigg was asked to clarify the use of the terms "moving" and "swerving" as between the Pajero and the Mazda. He stated that the use of "swerving" implied a "*relatively violent manoeuvre*" and also implied that there's "*a higher probability that the Mazda was on its incorrect side of the road*" (page 54 27/3/08). When asked whether the motion could be described by the Mazda driver taking evasive action immediately prior to the collision, Dr Grigg stated that he hadn't attempted to do the calculation in relation to that issue. He agreed that the position of the Mazda may have been an action of trying to get back on the correct side of the road (p55). He stated that whilst there was no direct evidence on this point it was a possibility that was raised by the angles of the vehicles on the road at point of impact as determined by the simulation.

53. Dr Grigg did prepare the calculations on this point during a break in his evidence. Using the estimated coefficient friction of .55 and the estimated speed of 70km/hr from the simulation, and Dr Grigg's estimation of the vehicles travelling at 20 metres per second, the tightest radius of the Mazda's turn which could be developed on the computer was 74 metres which would place the Mazda on the wrong side of the road prior to the point of impact. This conclusion was based on the optimum angles which the computer can fit to the scenario. When referred to the statement of opinion in the report (that there is no evidence which could be used to predict the movements of the vehicles as they approached the point of impact), Dr Grigg conceded that his contention of the possibility of the Mazda being on the incorrect side of the road prior to impact "appeared" to be a contradiction. He conceded further that there was no physical or conclusive evidence supporting his contention which he had extrapolated back from the computer modelling (p81-82 27/3/08). If, for instance, the coefficient of friction was different for some reason, the radius of the turn would come down and the degree to which the Mazda may have been on the incorrect side of the road would reduce. In fact, if the interpretation of the angle of the vehicles at the point of impact was wrong for any reason, that would have significant bearing on the contention that the Mazda was on the incorrect side of the road.

54. Based on the simulation, Dr Grigg estimated that Mr Brown would have been travelling on the incorrect side of the road for about 2 seconds for

a distance of 40 metres. When it was put to Dr Grigg that this could result in Mr Brown fairly violently trying to correct his position immediately before the collision, Dr Grigg responded: "*you looked at Brown's vehicle and you didn't look at the other vehicle. You can look at the other vehicle and say well, he was busily trying to get off to the left but maybe he wasn't on the left just beforehand…if you look at figure 1 (from the simulation), you were concentrating on the fact that the Pajero was apparently turning to the left to get back onto his correct side of the road and I'm simply saying well, perhaps the Mazda was certainly trying to get back to its correct side of the road but maybe it hadn't been on its correct side of the road earlier than that either*." The questioner said "*But there's no evidence to suggest the Mazda was on its incorrect side of the road at any stage?*" and Dr Grigg answered "*Well, there's no - the thing that you're pointing to about the Pajero apparently trying to get back onto the correct side of the road, the same weight has to be put on to the computer model saying the Mazda appears to be also possibly coming from its incorrect side of the road*." Next question "*but the reality is that the collision occurred in the western carriageway completely?*" and the answer was " *Oh, yeah, I accept that but we're talking about what effect the weather and environmental circumstances and so forth could have had on the vehicles in the circumstances.*" (p50-51 27/3/08) Further, it was put to Dr Grigg that "*The computer model doesn't show us what the vehicles were doing as they led up to the accident*" and he confirmed that was correct (p51).

55. The oral evidence given during cross-examination in relation to this issue was the first indication from Dr Grigg that that the Mazda may have completely travelled into the eastbound lane prior to the collision effectively causing the Pajero to take evasive action. This scenario was not mentioned to this extent in his report which is surprising given the importance of the issue. Dr Grigg has made reference to the statement in his report relating to the computer generated positioning of the vehicles at point of impact (Mazda swerving close to or over the centre line) as a suggestion of his current contention. I do not consider that statement to be suggestive of Dr Grigg's current contention which extends far in excess of the statement in the report. The presumed brief for Dr Grigg's report was to provide an analysis of how this collision occurred. He conducted the computer simulation for that purpose. The positioning of the vehicles is a critical issue in this analysis. I do not accept, as was suggested by BMA, that the questioning of Dr Grigg first drew his mind to this issue causing him to "enlarge" on his previous view. His contention was made in answer to questioning regarding Mr Brown's driving and an apparent desire to suggest that the other driver may have been equally or more to blame for the collision in the absence of any direct evidence supporting his contention. If this view had occurred to Dr Grigg previously then I feel confident he would have done the calculation as to the radius of the turn and documented the matter before giving evidence. The contention that the Mazda was on the incorrect side of the road prior to

the collision was not put to Sgt Price in cross-examination. One would expect, given the extensive cross-examination of that witness and analysis of his methods and findings, that the contention should have been put to Sgt Price. In the absence of any evidence other than Dr Grigg's late contention based on the computer modelling, I do not accept on the balance of probabilities that there is sufficient evidence to establish that the Mazda was on the incorrect side of the road prior to the collision.

56. Doctor Grigg stated (at paragraph 1 page 5) "*it can be seen from the above that although I believe the gouge mark was probably made by the Pajero, I agree with Sergeant Price's conclusion that there appears to be virtually no doubt that both vehicles were on the west bound lane of the road when the collision occurred.*"

57. As to the causative factors for the collision, Doctor Grigg considered that the relative box shape of the Pajero would be more likely to be affected by strong winds than the Mazda being driven by Senior Constable MacKenzie.

58. He opined that the severity of the thunder storm at the scene may have been greater in terms of both rain and wind than at the weather stations at Rockhampton and Yeppoon from which the official weather records came. No reason was provided for this supposition. He noted that the scene is a location that's relatively exposed to wind. He considered there was a fairly high probability that the storm was the major causal factor in the accident.

59. It was apparent during Doctor Grigg's evidence that he equated fatigue with falling asleep such that "*the driver is no longer in a position to observe the roadway and to respond to his position on the roadway*" (p31 27/3/08) and considered that whilst a micro-sleep may have been possible it was unlikely in the circumstances of the storm. He considered that the reaction time of Mr Brown may have been greater than normal due to his being tired but he considered there was a low probability that he would doze off when attempting to drive through a tropical storm and that similarly potential factors such as target fixation or momentary inattention were unlikely to have occurred in those conditions.

(v) Opinions of Fatigue Experts

60. Professor Smith, the Court appointed expert, has extensive expertise in areas including shiftwork and its relationship to fatigue. Professor Smith is an Industrial Psychologist who has conducted significant research on shiftwork. He does not claim to be a sleep expert but is of course aware of the issues regarding fatigue, especially in relation to its interplay with shiftwork.

61. The opinions expressed by Professor Smith (Day 31 pages 31-34 and Exhibit 148) support the conclusions of Sergeant Price that fatigue was

a contributing factor in this collision. Professor Smith stated that "*acute fatigue and prolonged or chronic fatigue arising from the pattern of sleep and wakefulness are linked to shiftwork and extended hours of work*" (p2 Ex 148 referring to (Akerstedt, 1995)). Acute fatigue has a linear component (duration of wakefulness since last main sleep period) and circadian (daily oscillation of alertness by time of day). Prolonged or chronic fatigue is a sleep debt carried over from the sleep-wake balance of previous days. Professor Smith examined the work and sleep hours of Mr Brown in the period leading to the collision and concluded that Mr Brown had acute fatigue on a linear basis (16.67 hours of wakefulness since his last main sleep) but that it was unlikely that there was a circadian or chronic fatigue aspect to Mr Brown's fatigue.

62. Professor Smith noted that the work contact hours (13) and travel time to Yeppoon (3) was in excess of the maximum of 14 hours work (including work contact hours and travel) identified in the draft BMA Blackwater Mine Fatigue Procedure. It is noted that the hours worked in the roster before the collision (9.5, 10.5, 12.45 and 13 hours) are gross hours of pay and were not all worked driving the truck. For instance on the 24th, the hour meter in the truck indicated 9.9 operational hours which would be the maximum truck driving hours by Mr Brown that day (in the 13 hour shift).

63. Professor Smith drew strong support from that data that fatigue arising from a combination of shiftwork hours and commuting driving hours was a feature in the collision on Mr Brown's part. "*His behaviour is likely to be impaired from fatigue arising out of extended wakefulness … he was required, potentially, to perform under conditions that required maximal behaviour rather than a lower level of behaviour …. It could have been the case that at that point in time, when a higher level than normal performance was required, that impaired performance had an effect … Lots of shift working drivers who are doing similar sorts of extended periods of wakefulness following shift – we've survey studies that show this across the literature*" (Day 31 page 32 lines 29-48). "*It is not unreasonable to conclude … that fatigue, due to extended wakefulness … had an important role to play in impairing the ability of the driver to drive within the road conditions*." (Day 31 page 33 Line 31-35)

64. In relation to Snr Const MacKenzie, Professor Smith, after examining similar data, concluded that the linear component of acute fatigue was 8.5 hours at the time of the collision. Snr Const MacKenzie would have had some impairment as he was working night shift and day sleeping (Day 31 page 34 lines 29-35).

65. Professor Andrew Dawson was called by BMA. Professor Dawson is a prominent Industrial Fatigue Specialist and an International Fatigue Management Expert. He has conducted extensive research and holds industry consultative experience including in relation to mitigation of

risks of fatigue through management of shift work and roster design. He has consulted for BMA over a number of mines for a number of years.

66. The Professor opined that fatigue is a difficult causal attribution to make in a motor vehicle collision and can really only be made after other causes have been considered. He makes the point that simply because someone may be tired, that does not necessarily enable the accident to be deemed fatigue related. The Professor further stated in his report (p4 Ex139): "*In practice, it is often difficult to discriminate between fatigue-related errors and errors due to inattention or distraction or loss of consciousness due to other causes. In many cases, fatigue is a cause-of-last-resort*. "

67. Fatigue-causing error is a complex issue which is not just the result of linear wakefulness. He stated (1/8/08 evidence p40 lines 46-55) "*if you want to know how tired somebody is, you need to know how long they've been [awake]…, what time of day it occurs, and the history of sleep … somewhere in the last 24 to 168 hours. So it's a complex combination of factors*".

68. In his report dated 22nd of August 2007 Professor Dawson (Exhibit 139 pages 2 and 4) states –

"*4. In general terms it can be difficult to determine definitively whether an accident is fatigue-related. For fatigue to be considered a likely cause of an accident it is necessary to demonstrate that:*

4.1 The nature and circumstances of the accident are consistent with a fatigue-related error; and

4.2 The level of fatigue experienced by the individual was consistent with an increased risk of fatigue-related error.

5. *Unfortunately, for accident investigators, fatigue is a difficult attribution to make. This is because fatigue is a relatively diffuse state of cognitive impairment that increases the likelihood of a range of errors, as well as the likelihood of inadvertent sleep onset.* "

69. Professor Dawson stated that whilst it was not possible to conclude that Snr Const MacKenzie was fatigued, it was difficult to draw the conclusion that he was not fatigued having regard to the circadian features associated with disturbed sleep patterns on night shift. He also considered that it was not possible to clearly state one way or the other whether Snr Const MacKenzie had reduced alertness due to sleep inertia and that was or was not a potential cause of the accident (page 9-10 Ex 139).

70. It is noted that there was no indication from witnesses who were with Snr Const MacKenzie that he was suffering any sleepiness associated with sleep inertia which was considered given that he woke from sleep

to dress and drive to work. He was chatting quite normally and acting appropriately during the drive with Const Koellner. There was also no evidence of significant levels of chronic fatigue on the part of the Snr Const or that he was suffering chronic fatigue in light of the medical evidence heard.

71. Professor Dawson (Exhibit 139 pages 3 to 8) discounts fatigue on the part of Mr Brown on the basis that his period of wakefulness at 16-17 hours was not excessive when compared to the mean sleep duration and wakefulness in non-night shift working people in the Australian population. He concluded that it was unlikely on the balance of probabilities that Mr Brown was in any way suffering from work related fatigue. Mr Brown's shift lengths were moderately but not excessively long within the mining industry and he had good quality sleep patterns while working.

72. As to the determination of fatigue as a causal factor in the collision, it should be remembered that in the context of fatal traffic collisions, in most cases, a loss of consciousness for another reason is likely to be identified in a post mortem. Professor Dawson describes a classic fatigue crash as one where a person falls asleep at the wheel and fails to take corrective action or where a driver is risk-taking or showing poor judgment in driving. The Professor goes on to say that the weather conditions would cause an increased level of arousal due to task engagement and that would lead to a "*concomitant reduction in sleepiness*" and therefore the likelihood of fatigue-related error.

73. The Professor stated that the reported veer onto the incorrect side of the road by Mr Brown might be indicative that he was awake and not asleep as that might have been indicated by a failure to take a turn or a slow drift in an inappropriate direction. This conclusion seems to downplay the interplay of the weather conditions at the time of driving and the reported effect that the high winds would have had on Mr Brown's vehicle.

74. It is noted that there would seem to be cases where more subtle indicators of fatigue as a causative factor of a collision are present, particularly those where tiredness or fatigue adversely affect reaction time of the driver in responding to an unexpected situation, or a lack of driver attention due to micro sleeps or tiredness not resulting in actual sleep.

75. After postulating in his report (page 4) that it would be wrong to conclude with any measure of confidence that fatigue by Mr Brown was the primary cause of the collision, in his evidence, (day 27 p 83) Professor Dawson acknowledges that his expertise cannot extend to answering the actual question of whether fatigue was a contributing factor in a particular accident.

76. BMA challenged the acceptability of Professor Smith's conclusions in relation to fatigue (especially regarding Mr Brown) on a number of bases. The major challenges centre around what is described as a misquoting of Professor Dawson's study comparing the effects of fatigue and impairment from blood alcohol concentration and further an alleged tendency to over-simplify a complex issue in order to reach a simple conclusion and adhering to a particular position tainted by his longstanding views regarding the desirability of compressed shift rosters for commuting workers in the Central Qld Mines.

77. BMA submits that the opinion of Professor Dawson (that there is insufficient evidence to support a conclusion that either driver was fatigued) should be preferred over that of Professor Smith as he is more qualified and his evidence is not "beset" by the difficulties of Professor Smith's in their view.

C. Findings – Yeppoon Crash

78. It is clear from the evidence and opinions of all of the investigators and experts that a major contributing factor in the collision was the adverse weather conditions. The site was relatively exposed to the weather. The tropical storm was obviously severe and widespread and there would have been high wind gusts and heavy rain at times during the storm. Given that the collision occurred after 9pm at night and the area was not lit, the weather conditions would have made driving difficult. Mr Brown's vehicle shape and size may have made it more prone to disruption of travel in high winds. There is a possibility that visibility of the drivers may have been effected, particularly the older Pajero vehicle in relation to internal demisting of the windscreen. There is also a possibility that there was sufficient water on areas of the road to cause some disruption to traction but there is insufficient evidence to support water-planing as a major cause of the collision.

79. There is no evidence of fatigue on the part of Senior Constable MacKenzie as a driver. There has been challenge to the conclusion of Sgt Price that the major contributing factor to the collision was Mr Brown's fatigue. It is clear that Mr Brown had worked a long day and had expressed some tiredness to Mr Korn during the trip home which Mr Korn considered that he recovered from with a short break. His hours of wakefulness and activity prior to the collision are relevant. The verbal statement of Ms Hillier to Police that Mr Brown had expressed tiredness to her before the journey, whilst not conclusive in the circumstances, lends some support to the contention that Mr Brown was tired. It is reasonable on the evidence to conclude that a person who was tired might have slower reaction time than he might ordinarily have. This may well have impacted on Mr Brown in trying weather conditions. The movement of his vehicle onto the incorrect side of the road is also a factor indicating fatigue or momentary inattention on the part of the driver.

80. After consideration of the evidence, I find that the contributing causal factors in this collision include adverse weather conditions and, to a lesser extent, fatigue, particularly in relation to the potential effect on Mr Brown's reaction time to unexpected events such as gusty winds. Whilst I am not satisfied that fatigue on the part of Mr Brown was the major contributing factor in the collision, I am satisfied that there are sufficient indications that it was likely to have been a contributing factor. I do not consider that there is sufficient evidence of fatigue on the part of Senior Constable MacKenzie sufficient to contribute to the collision.

The Dysart Motor Vehicle Accident

A. How did the motor vehicle collision occur?

(i) Police Investigation

81. At about 6:40 am on the 1st of February 2007 Sergeant McKinnon from Dysart Station attended a two vehicle traffic collision on the Dysart-Middlemount Road, one kilometre south of Dysart By-pass Road intersection, Dysart. The two vehicles at the scene were a Ford Laser sedan registration 759 DGK which was off the roadway and a Daewoo sedan registration 574 EGN which was on the roadway. Both vehicles had sustained major damage. The driver of the Daewoo was Katie Harrold who was been treated by ambulance officers for minor injuries when Police arrived. The driver of the blue Laser, Robert Wilson, was still located in the vehicle. He was deceased. At the time Police attended, Mr Wilson did not have a seatbelt fitted and was trapped by his legs inside the vehicle. No person was located by Police who had witnessed the collision apart from Ms Harrold.

82. Mr Wilson was aged 33 years and was in good health. He had been working night shift at the Norwich Park Mine and was travelling home from his shift to Dysart at the time of the collision. Ms Harold was 20 years of age at the time of collision. She left her home in Dysart at about 6:35 a.m. to travel to the Norwich Park Mine where she was doing vacation work. She turned her headlights on as soon as she left home and there was some light rain coming and going.

83. Immediately prior to the collision Ms Harrold was travelling at 100 kilometres per hours (which was within the speed limit) and she first saw the Ford Laser when it was about four to six hundred metres ahead of her. The Laser was travelling towards her in a normal fashion. When the Laser was about five to ten metres away from her, she said that it suddenly crossed on to her side of the road. She just managed to turn the steering wheel towards the left side of the road so that the vehicles did not hit directly head-on. Just prior to the impact she saw the Laser slightly turn back towards the correct side of the road but it was too late and her vehicle collided with the Laser coming into contact with the driver's side front panel of her car. She said the vehicle ran into hers at an angle of 35-40 degrees. Her driver's side

window and windscreen shattered and her car spun sideways and was sliding up the road in the same direction she had been travelling in. She did not see the Laser after it collided with her.

84. Ms Harrold's vehicle came to rest about ten to fifteen metres up the road. Her driver's side door was stuck closed. She saw the Laser about 30 metres away on the grassy area to the side of road. Using her mobile phone, she called her mother at home to raise an ambulance and ran over to check the other driver. She went to the car and saw that the driver was not moving, that he was in the passenger side of the car and that he had blood dripping from his mouth. By this time other people had stopped to lend assistance and Ms Harrold's father and brother arrived to support her. Police and Ambulance also arrived at the scene.

85. Mr Brett Jorgensen was a workmate of Mr Wilson's and was on a shift with him the night before the collision. At the end of the shift around 6.00 am he had a chat with Mr Wilson, having a laugh with him about the events of the night. It was only a brief few words and Mr Jorgensen then walked off. After putting his gear away Mr Jorgensen left the mine site in his car alone. As he came around a corner 20 kilometres outside of Dysart he saw Katie Harrold's car on the right hand side of the road in the distance. He didn't know there was an accident until he got closer and saw the debris on the road and noticed Mr Wilson's car on the opposite side of the road. He pulled over, called 000 on his mobile phone and went to assist. He saw Katie Harrold crawl out of the passenger side of her car and talk on the telephone. He called to her to stop her going over to Mr Wilson's car and assisted her away from Mr Wilson's vehicle.

86. He went to Mr Wilson's vehicle and did a quick check because there was nobody seated in the driver's seat. As he was inspecting around the car for any other potential victims, Mr Locock turned up and they located Mr Wilson in the car and attempted to assist him. He was slumped in the passenger side with his legs trapped in the driver's side. When they opened the door he sort of fell out so they had to hold him up. There was no sign of life in Mr Wilson at that time. They tried to sit him up and close the door but the driver's side door wouldn't shut so they did their best to secure him until the ambulance arrived. He states that the ambulance officer put the seatbelt on Mr Wilson to hold him in position.

87. When Sgt McKinnon from Dysart Police arrived at the scene it was an overcast day and light rain was falling. Mr Wilson was in his vehicle being attended to by ambulance officers. Ambulance Officer Musch stated that when he arrived and attended to Mr Wilson, he appeared to be sitting on the passenger seat. There was another person inside the vehicle immobilising his head and neck. That person appeared to be a miner as he was in work clothes, and was sitting in the rear passenger seat of the vehicle. Mr Wilson was deceased. His feet were jammed in

the foot-well of the driver's side which had been crushed in. His right arm was caught between the two front seats that had been pushed together from the impact. At that time Mr Wilson was not wearing a seatbelt. The driver's side seatbelt was in the unused position. Mr Musch placed the passenger seatbelt on Mr Wilson to hold him up and prevent him from slumping down into the passenger's foot well.

88. The collision was investigated by Sergeant Bellert, a part-time TAIS Officer from Mackay. He found on investigation that the Dysart-Middlemount Road was a sealed bitumen road with single lanes of traffic to travel in either direction. The width of the lanes combined was 6.8 metres. The road was flat and straight for some distance either side of the collision site. He stated the road appeared to be in good condition with no obvious defect that may contribute to the collision. The road was wet at the time of examination on the 1st of February due to sporadic light misty rain which continued to fall during the day. He saw a six metre tyre mark near the centre line marking of the road and three gouge marks in the east bound lane leading towards the Daewoo sedan. He was of the opinion that those marks were caused by that sedan. He concluded that the point of impact between the two vehicles occurred in an area between the conclusion of the tyre mark and the commencement of the first east bound gouge mark. Both vehicles were inspected and were found to be in a reasonable condition.

89. Due to the fact that Mr Wilson had completed a night shift prior to the journey, Police made enquiries with the Mine staff as to Mr Wilson's state during and after the shift and his work environment and conditions. Enquiries were also made with his partner and family about his usual habits regarding **fatigue** management.

90. Narelle McMahon, a Supervisor at the mine, provided police with information regarding Mr Wilson's shift on the night prior to the collision. Mr Wilson was operating a front end loader at Ramp 10 loading the trucks. He was the only loader at Ramp 10 and there were six coal haulers working with him. There would have been times during the shift that Mr Wilson would have been waiting for the coal haulers to return from the pit and Ms McMahon felt he would have had an opportunity to have a nap if he wanted to. There was an unwritten rule at the Mine that if a worker was feeling tired they could go to the crib room and have a sleep on Lazy-Boy recliner chairs which were provided for that purpose. There was also the option of swapping out from the machine being operated in order to have a rest (at the discretion of the foreman). Mr Wilson did have a sleep on one previous occasion during a rainy shift when most workers were in for a sleep. Mr Wilson had never complained to Ms McMahon about being tired and was a very good worker in that when he finished his allocated work, he would look for more. She described him as mature, a safe co-worker and very safety conscious.

91. At the commencement of the shift on this occasion, Ms McMahon chatted to Mr Wilson for a couple of minutes and felt he was his normal self, joking and laughing. He asked whether there were any overtime shifts available. During the nightshift Mr Wilson took a crib break at about 10 p.m. with some workmates. Ms McMahon didn't speak with Mr Wilson again that night. Just before the completion of the shift it started raining, but not sufficiently to halt work in the pit. This was Mr Wilson's last shift before two days off but he was intending to work an overtime shift on one of those days. Ms McMahon indicated that Mr Wilson's driving habits were sound and that he usually drove on the road to Dysart at about 90 kilometres per hour.

92. During the course of the shift prior to the collision, Mr Jorgensen was driving a truck and Mr Wilson was driving a loader which supplied the truck, so they had interaction during the shift and at the crib breaks. There were six trucks working with the loader on that shift and there was approximately an hour between loads for each of the trucks. Mr Jorgensen saw Mr Wilson at both of the crib breaks at 10.00 pm and 2.00 am. On the second crib break Mr Jorgensen remembers Mr Wilson sitting at the end of the table where he was and dozing off in his chair. He saw him for about 10 to 15 minutes before leaving the crib room. Mr Jorgensen said that this was not unusual for workers in the crib room, that "snoozing" in the crib room is encouraged and he has done it himself at times. Mr Jorgensen also chatted briefly with Mr Wilson at the end of the shift.

93. Mr Locock saw Mr Wilson at both crib breaks. At the 10pm crib, they spoke briefly and Mr Wilson seemed normal. At the second crib in the early hours of the morning, Mr Wilson looked a bit tired and seemed steady (slow). Mr Locock commented that everyone is a bit tired at that time of the morning. After the second crib, Mr Locock continued to receive loads of coal from Mr Wilson and stated that Mr Wilson was operating well in his work. At the end of the shift he thought he looked fine.

94. Mr Watson was relieving as Supervisor for the mining area on the 1st of February 2007. He arrived at Norwich Park at 4:50 am and there was light rain falling at the time. He spoke with Mr Wilson in relation to operational matters whilst he was operating the loader. Mr Wilson came into the main office where Mr Watson was working at 6:15 am to sign off. They had a general conversation and a joke. Mr Wilson didn't mention being tired and Mr Watson did not consider that he looked tired. The shift roster was usually two day shifts, two night shifts, two days off then two days, two nights and six days off. There was the opportunity to work overtime shifts on days off. Mr Watson stated that on occasion Mr Wilson would nightshift at Norwich Park and would leave the mine area and head straight to Rockhampton where his partner resided in their house. He told Mr Watson that if he was feeling tired during this journey he would pull over to the side of the road and have a sleep before continuing.

95. Mr Lawson was working on shift in the area of Mr Wilson. He was driving a dozer, ripping and pushing coal off the high wall and stockpiling it for transport. He considered the coal was too hard for the loader to access without the dozer performing these tasks as it had not been shot (drilling and blasting to break up the coal). Mr Lawson stated that it was tiring work and the loader driver was "*under the pump*" (Transcript day 19 page 8) to keep loading trucks and have a ready supply of coal for the next load. He said sometimes there would be two trucks waiting at a time for the loader to load them. It was a fairly busy shift in his view. Mr Lawson had radio contact with Mr Wilson during the shift about operational matters and didn't pick up anything about Mr Wilson's manner that might suggest that he wasn't alert. He said that Mr Wilson would not complain and was a quiet fellow at work. Mr Lawson saw Mr Wilson at the first crib break and he seemed fine. He next saw him at 6.20am at the end of the shift and said that he "*looked buggered…tired…his eyes were out of his head… and with bloodshot eyes*". Mr Lawson commented that he does not feel "*real flash*" at the end of a night shift and that everyone looks "*a bit shattered*" after a normal night shift (page 17). Mr Lawson was not asked to give a statement to Police until 13 months after the collision but said he could remember his impression of Mr Wilson well given that he died shortly afterward. He said there was some talk around town about the accident but no specific conclusions were drawn by him as a result.

96. Mr McConochie was the last at the mine to see Mr Wilson. Their cars passed near the gate and Mr McConochie waved with Mr Wilson waving and smiling in return.

97. Mr Wilson's partner of about five years standing was Ms Pamela Luck. She stated that for the 12 months prior to the collision, Mr Wilson had been driving the Laser as it was cheap to run. It was mechanically sound and air-conditioned. Ms Luck would visit Mr Wilson's Dysart residence at least once a month. Mr Wilson was a man of quiet habits, having a couple of beers and watching television before retiring early before his shift the following day. When working nights, he had no trouble sleeping during the day. He was used to working shifts and was described as very mature and responsible in his approach to shift work. Mr Wilson was a healthy eater and was on the Tony Ferguson diet. He had lost 4 kilograms in the week before the collision. At the end of his roster period, on a six day break, Mr Wilson would travel to his home with Ms Luck at North Rockhampton. He would see his children who resided with their mother in Bundaberg during holidays.

98. Mr Wilson's sister, Narelle, stated that Mr Wilson had ended his relationship with Ms Luck. Ms Wilson and her partner, Bill Riddiford, shared the BMA house that Mr Wilson lived in at Dysart for about 18 months. The house was air-conditioned with blacked out windows in the bedrooms and was generally of good quality. She confirmed Mr

Wilson's habits. Mr Wilson had been a plant operator for 15 years and was used to shift work and its requirements. He had received a fatigue management booklet from work. He generally had opportunity for sleep for 10 – 10.5 hours per day. He had his own bedroom and never complained of difficulties in sleeping. He did not take sleeping tablets or drink caffeinated drinks at home. He would spend his free time at home, working on cars or remote controlled model cars. He was not a big drinker or partier. He generally spent his short breaks in Dysart and on longer breaks travelled to his home in Rockhampton.

99. Mr Wilson had been on holidays for January 2007 and this was his first roster back at work. He had worked an additional shift during a rest day on this roster in order to earn more money. On the day prior to the collision, Mr Wilson laid down for a "camp" on the couch after lunch. Mr Riddiford saw him at 4pm but could not say whether he had slept. After tea, Mr Wilson went to work on his car and Mr Riddiford commented that he looked tired and not his usual self as if he had no sleep. By the time Mr Wilson later left for work he was conversing normally with Mr Riddiford and seemed to have shaken off his earlier grogginess. BMA expressed concern that Mr Riddiford may have reinterpreted his memories in light of subsequent talk about fatigue causing the collision but Mr Riddiford was straightforward in his comments and there is nothing to suggest this concern is warranted.

100. Norwich Park Mine had a Fatigue Management policy in place at the time of the incident.

(i) Condition of the road

101. Mr Herring, a Civil Engineer with Main Roads, Mackay, gave evidence relating to the history and condition of the Middlemount Dysart Road. He has experience in road design. At the time of preparing his report for the Inquest, he was Senior Engineer of Planning and Traffic which included safety and road crash site investigations. He attended the crash site on 8th February to investigate the site with a view to determining the engineering aspects of the crash site, such as the road geometry and conditions.

102. The road was commissioned by Utah Development Company in 1976 as an access road between Dysart and the mine. It did not seem to be connected to the road network to the south of the mine. The road was handed over to Main Roads and resealing works were conducted on the road in 92/93 financial year and in 1999.

103. Mr Herring's inspection of the road at the accident site indicated that there was some rutting in the outer wheel paths caused by constant traffic or heavy vehicle use of the road. There was some edge breakage and uneven edges and a 1 inch drop to the surface of the shoulder which was not significant enough to cause problems for motorists in Mr Herring's view. The road was well drained. He did not consider any remedial works necessary at the collision site. He did not

consider the condition of the road to be contributory in the collision. Mr Herring did agree that the rutting would tend to have drivers moving towards the middle of the road.

104. Mr Jorgensen stated that the road was similar to others in the region in that it was a little bit narrow and the shoulders tended to dip and dive a little and the edges of the bitumen were a bit jagged. When driving on the road he tended to drive towards the centre line a bit more than he does usually to avoid the edges but when other vehicles are travelling in the opposite direction he pulls over to give sufficient room to pass. He said that the road is basically smooth but becomes rutted along the edges in places, along with depressions from wheel marks of larger heavy vehicles. Those ruts and depressions tend to fill up with water when it rains but Mr Jorgensen stated he had never had any problem with negotiating the roadway himself in his four wheel drive vehicle. On the morning of the accident it was drizzling rain from about 5 o'clock but there had not been sufficient rain to fill any holes on the road with water. He said that the road was greasy and wet but there had been no where near enough rain to fill up the crevices with water. Mr Locock commented that there was drizzly rain all evening and that morning and that driving conditions were greasy.

105. Ms McMahon also criticized the condition of the road (as did most of the mine workers who gave evidence), stating that it was rough with big bumps in it and not wide enough.

106. Mr Lawson gave evidence that the road was rough and narrow and was not up to standard for the volume of traffic on it. The road surface was uneven, had potholes and the edges of the bitumen dropped away some inches to the dirt shoulder in some places. He said shift change periods were particularly busy times and that heavy vehicles were problematic given the narrowness of the two bridges on the road. He said that Police presence on the road was about once a month.

B. What were the contributing factors to the collision occurring and what extent, if any, was fatigue a contributory factor?

(ii) Police conclusions as to the cause of the collision

107. Sergeant Bellert, a part-time TAIS Officer from Mackay, was tasked by Sgt McKinnon to prepare the scale plan of the collision site while Sgt McKinnon investigated the matter proper.

108. Sergeant McKinnon concluded, from the positioning of Mr Wilson when ambulance officers and police arrived, that he was not wearing his **seatbelt** at the time of the incident and had been flung around inside the vehicle during the incident. The seatbelt on the driver's side was in the unworn position, was in tact and had not been cut or torn. Sgt McKinnon considered that Mr Wilson's death was contributed to by not wearing a seatbelt although it was thought that he may still have

suffered major injuries or death as a result of the collision even with a seatbelt in place. Sergeant Bellert agreed with these conclusions.

109. Sergeant McKinnon concluded that fatigue on the part of Mr Wilson after working a 12 hour night-shift had contributed to the collision. BMA submit that Sgt McKinnon's opinion was coloured by his perception of his own fatigue at the end of night shifts. Sgt McKinnon stated that he had received no formal training in fatigue but had formed views based on his experience in the Police Service. Sgt McKinnon has long experience as a Police Officer and had worked in a mining area for a period of time. His experience with traffic matters would equip him to be familiar with the concept of fatigued driving. He considered that no-one could be well adjusted to shift work due to the disruption to sleep patterns. He also based his opinion on the information given by Ms Harrold at the scene. I am not satisfied that the Sgt's opinion as to fatigue was unduly coloured by his personal opinions on shift work but was based on his overall knowledge based on his personal experience and experience as a Police officer.

110. The Police conclusion was that the collision occurred in Ms Harrold's lane of travel but close to the centre line and that the vehicle of Mr Wilson had crossed onto the incorrect side of the road for an unknown reason, probably fatigue but also possibly inattention of the driver.

(iii) Opinion of Mr George Foessel

111. Mr Foessel analysed the circumstances of the Dysart collision and prepared an undated report (exhibit 30). Mr Foessel concluded that fatigue was the least likely cause of the collision on the basis of his review of the statements gathered by Police from Mr Wilson's co-workers. Due to the additional evidence on this point gathered after the preparation of the report, Mr Foessel placed some weight on Sgt McKinnon's assessment of fatigue as a cause of the collision. The four key factors Mr Foessel identified as contributing to the collision were road surface condition, weather conditions, the handling characteristics of front wheel drive vehicles and possible target fixation/driver error. Mr Foessel agreed that given the position of the seat belt after the collision, that Mr Wilson was not wearing a seat belt.

112. Mr Foessel stated that the road was narrow (6.4 metres wide) and had no fog lines, the road edges were broken and poor and with up to 1 metre wide faults in each lane in the vicinity of the incident which were thought to be likely to force the drivers towards the centre of the road. Mr Foessel had witnessed this tendency during his site inspection. The shoulders were wide but made of rack and clay and would be difficult to manage in wet conditions. There was a degree of drop off to the shoulder height and potholes would make the transition to the shoulder difficult. Rainy weather was thought to be likely to compound the hazards from both the faults and the broken edges of the road. Generally the road was considered to be of a poor standard given the

volume of traffic to and from the mine and in comparison to other roads in the area.

113. Both vehicles in this collision were front wheel drive vehicles and it was postulated that if either of the vehicles hit a puddle of water, they could have developed a skid and lost control. It was also postulated that Ms Harrold's habit of checking the number plates of oncoming vehicles to see if she knew the driver, combined with the wet road and poor condition of the road, may have caused her to target fixate on the oncoming vehicle. He felt that the skid marks indicated that Ms Harrold's vehicle was travelling towards Mr Wilson's and the damage was indicative of her car colliding with his.

114. Mr Foessel opined, from Ms Harrold's description of the collision, that there was no evidence of any loss of control of either vehicle prior to the point of impact.

(iv) Opinion of Dr Grigg

115. Dr Grigg generated a computer simulation of the Dysart collision *"in order to get a better understanding of the possible circumstances of the accident*" (p5 1. report). The scale plan prepared by Sgt Bellert was used in the computer program to set the road details and rest positions of the vehicles. Preliminary speed estimations were based on the extent of the damage and the severity of injury to both drivers. A number of iterations were performed in order to determine the point of collision. This collision proved particularly difficult to conduct the simulation on due to the side swipe nature and heavy impact of the collision, the distances and terrain over which the vehicles moved after impact and the nature of the damage to each vehicle and the impact that damage had on the movement of the vehicles.

116. Dr Grigg concluded that the road was sufficiently wide for the vehicles to pass without having to move onto the shoulder. The point of impact was virtually on the centreline. He agreed with Sgt Bellert that the gouge marks on the road were caused by Ms Harrold's vehicle (although he thought from a point further forward in the vehicle than Sgt Bellert did). The simulation suggested the speed of both vehicles at the time of collision was 95km per hour giving a closing speed of 190 km per hour. Dr Grigg agrees that the tyre mark on the road was caused by the Nubira as stated by Sgt Bellert and comments that the offside of the vehicle is virtually right on the centreline and parallel to it. The Laser was towards its correct side of the road and was at least partially completely across the centreline.

117. Dr Grigg puts the point of impact (based on the computer modelling) further south than Sgt Bellert who was relying on the gouge mark on the road and a patch of oily residue on the road. Dr Grigg considered that engine fluids are not always indicative of the point of impact. The difference in opinion was longitudinal and not related to the lateral positioning of the vehicles on the road. I am satisfied on the evidence

that the point of impact was as described by Sgt Bellert as the physical evidence is consistent with this view as opposed to the inference drawn from the computer simulation. In any event, both marks attributed by each of the witnesses to be the point of impact are in a longitudinally similar position relevant to the centre line and no further findings are affected directly by the position of the point of impact.

118. Ms Harrold had stated that she had turned the steering wheel to the left to avoid a head on collision but Dr Grigg concluded that this must have occurred after Ms Harrold's vehicle was over the centreline. Further he states that the damage to the vehicles does not support Ms Harrold's version of the positioning of the vehicles at collision and that she may have been target fixated on the number plate of the approaching vehicle and therefore moved towards it unintentionally. He says that there is no indication of her taking evasive action except if she was already over the centre line and that it was her vehicle which has "*ploughed into*" Mr Wilson's and not the other way around. Sgt Bellert was of the opinion that Ms Harrold did take evasive action as evident from the skid mark ¼ to 1/3 car-widths within her lane. Dr Grigg disagreed. Sgt Bellert agreed that Ms Harrold's version seemed to be inconsistent with the damage to the vehicles (Transcript 26/3/2008 p47). This would seem to be so in relation to the angle of collision only.

119. Dr Grigg postulated that Mr Wilson may have been confronted with a vehicle approaching him on his side of the road and he may have diverged onto the incorrect side of the road in an effort to avoid a collision, swinging back just prior to impact. He further opined that whilst Mr Wilson would probably have been tired after his shift there was nothing to suggest him being inattentive prior to the collision but conceded that there was a low probability that he was wearing a seat belt.

(v) Opinions of Fatigue experts

120. Professor Smith determined that Mr Wilson's linear acute fatigue component at the time of the collision was 14.67 hours. Further, given the early morning timing of the accident, the circadian component of acute fatigue may have added to the overall level of fatigue of Mr Wilson. Chronic fatigue build up during the roster cycle was also likely to have been present but not excessive. Professor Smith concluded that Mr Wilson was fatigued such as to affect his ability to drive safely on the morning of the collision.

121. Professor Dawson could not be satisfied that there was sufficient evidence that fatigue on the part of either driver was a cause of the collision. He concluded that there are alternate plausible explanations to fatigue on the part of Mr Wilson which explain the loss of control of his vehicle (Ex 27 page 11). He made the distinction between driving with tiredness and unsafe driving. He was of the opinion that there was insufficient evidence from which to conclude that Mr Wilson was operating the vehicle with a level of fatigue that was unsafe or could be

solely attributed to his work hours. He would not conclude that the accident was not fatigue related but that there was insufficient evidence to conclude that the accident was fatigue related.

C. Findings – Dysart Crash

122. Sgt McKinnon, an officer with extensive first hand knowledge of the policing and first on the scene, was of the opinion that **fatigue** contributed to the accident. Sgt Bellert the TAIS officer investigating the incident agreed with that assessment. Ms Harrold's evidence was to the effect that there was no apparent reason for Mr Wilson's vehicle moving to the incorrect side of the road. Various descriptions were given by Mr Wilson's workmates regarding his fatigue during and after working a night shift immediately before the fatal drive. The expert opinion of Professor Smith in relation to the shift cycles, the number of consecutive night shifts and the working of extra shifts during days off inferred that Mr Wilson would have been fatigued.

123. I accept that the evidence indicates that Mr Wilson seemed tired at the end of his night shift roster. Mr Lawson's evidence of the nature of the work undertaken on the last shift and his observations of Mr Wilson are supportive of a level of fatigue. It may be, as was inferred in cross-examination of witnesses, that Mr Wilson was no better or worse than at the end of any other night shift or indeed any other worker in a similar position but I am satisfied that there is objective evidence that there was a level of fatigue. Whether that level of fatigue described by Professor Smith (I am not relying on the extrapolation to a comparative blood alcohol level) was, as Professor Dawson stated, such that Mr Wilson was unable to drive safely is a matter which cannot be exactly determined. There are other potential causes for the collision.

124. **Driver inattention** is an obvious potential cause for this collision. It was suggested that Mr Wilson may have been reaching for a water bottle in the car, explaining why he did not have a seat belt on, and indicating a loss of attention to driving which caused the accident. Whilst there was evidence that a water bottle was located in the car, there was no evidence one way or the other on this point and whilst it is a possible factor in the collision, there is less evidence to support that specific scenario than other factors.

125. It may have been that Mr Wilson was inattentive for any number of reasons. The movement of the vehicle towards the oncoming traffic and the point of impact on the incorrect side of the road without marked avoidance of the collision are likely to be indicative of inattention or fatigue and a loss of concentration on the task of driving.

126. The **condition of the road** as described by witnesses who were regular users of the road (despite the width of the road being assessed as acceptable by Main Roads) was such that there was a tendency of drivers to stay towards the middle of the road, reducing the margin for error of colliding with oncoming traffic. I accept that evidence and find

that to that extent, the condition of the road was a minor contributory factor as it appeared to influence the driving behaviour of at least one of the drivers in this incident.

127. Other potential causes which have been postulated as potential contributors to the collision are not borne out by the evidence. In particular, whilst there was some water in wheel ruts in some areas of the road the evidence indicates that it was of insufficient extent to cause a loss of control of the vehicle.

128. I am satisfied on the evidence before me that the cause of the collision was driver inattention and/or fatigue on the part of Mr Wilson exacerbated by the width and condition of the road. I find that Mr Wilson's vehicle moved partially into the incorrect lane and the collision occurred in that lane with some evasive action being taken by the drivers immediately before impact.

FORMAL FINDINGS

Yeppoon Accident

129. The deceased persons were Graham Peter Brown born on the 23rd of October 1951 and aged 54 years of 30 Georgina Drive, Yeppoon employed by C E Marshall and Sons at Blackwater Mine and Senior Constable Malcolm James MacKenzie born on the 16th of December 1961 and aged 43 years, residing at 7 Pandanus Street, Cooee Bay and employed by the Queensland Police Service.

130. Mr Brown and Senior Constable MacKenzie both died as a result of multiple injuries sustained by them in a motor vehicle collision. Mr Brown was killed instantly upon impact in the collision which occurred at approximately 9:20 pm on the evening of Monday the 24th of October 2005. Senior Constable MacKenzie died very quickly, without pain and whilst unconscious, in the few minutes after the head-on collision which occurred at the same time.

131. Mr Brown and Senior Constable MacKenzie died on the Rockhampton-Yeppoon Road at a point approximately 104 metres north of Mulara Road intersection, approximately 10 kilometres west of Yeppoon in Central Queensland.

132. The deaths of each gentleman were caused by multiple injuries sustained in a head-on motor vehicle collision. There were a number of potential causes for the collision. At the time of the collision a violent tropical storm resulting in heavy downpours of rain and strong gusting winds was in the area, causing poor driving conditions and possibly effecting visibility on the Rockhampton-Yeppoon Road at the time of the collision. Other contributing factors to the collision were fatigue on the part of Mr Brown who had worked a 13 hour shift as the last shift of a roster at Blackwater Mine prior to driving a little over 2 hours to the

site where the collision occurred on his way to his residence at Yeppoon.

Dysart Accident

133. The deceased person was Robert John Wilson born on the 14th of December 1973 who, whilst working near Dysart resided at 7 Beresford Crescent Dysart in Central Queensland, but his permanent address was 13 Peltophorum Street, Koongal, Rockhampton in Central Queensland. Mr Wilson was employed at the Norwich Park Mine near Dysart.

134. Mr Wilson died as a result of multiple injuries sustained by him in a motor vehicle collision which occurred at approximately 6:40 am on the morning of Thursday the 1st of February 2007 on the Dysart-Middlemount Road, Central Queensland approximately 1 kilometre south of the Dysart Bypass Road.

135. The cause of death was multiple injuries sustained in a motor vehicle collision in which Mr Wilson's vehicle travelled across the centre line of the road and came into collision with an oncoming vehicle. The collision occurred as a result of driver inattention and/or fatigue on the part of Mr Wilson exacerbated by the position of the vehicles due to the width and condition of the road potentially exacerbated by the greasy conditions from light rain.

D. Are there any matters connected with any of the deaths in which there can be improvements to public safety by changes in policy or procedure, including in relation to shift work and commuting which might avoid deaths occurring in similar circumstances in the future?

136. **Driver fatigue** is an issue connected with the deaths in these collisions. It is an issue which was the subject of lengthy evidence and much debate and submission during the course of the Inquest. I intend to make comments in relation to this issue which is a matter which affects public safety and there are potential actions which may work towards avoiding the occurrence of similar deaths in the future.

137. Driver fatigue is treated by Queensland Police and Queensland Transport as one of the fatal four causes of road deaths. The public safety implications of driving whilst fatigued and exposure to crash risk for the general public is clear. This has been previously acknowledged in the heavy road transport industry and has been the subject of widespread public comment in recent years.

138. These collisions occurred in Central Queensland and involved mine workers and others. The mining industry represents a subsystem of road use within the broad road use system within the Bowen Basin and the rest of regional Queensland. It is unnecessary in the context of this Inquest to demonstrate an over-representation of fatigue-related

crashes in the Bowen Basin in order to trigger public safety concerns in relation to the risks of driver fatigue. The general import of the evidence from Queensland Transport and Queensland Police Service was that the proportion of fatigue-related crashes in Central Region (an area including the Bowen Basin with significant coal mining activities) is significant in comparison to the rest of the State. The issue therefore bears examination.

139. The two collisions under investigation in this Inquest could be seen to highlight broader issues affecting not only the general public as drivers but particularly for organisations that operate business on a 24 hour, 7 day basis. Shift work was commented upon in evidence by Professor Narelle Haworth (Exhibit 32 page 11 and 21) -

"Epidemiological and experimental studies have shown shift work to be associated with an increased risk of road crashes for a wide variety of occupations from nurses and medical residents, to truck drivers, especially on the commute home after a nightshift (Akerstedt, Peters, Anund and Kecklund, 2005). Shift work appears to contribute to fatigue by two mechanisms; increasing the likelihood that activity will occur after too many hours of wakefulness and rotation of shift cycles causing circadian dysrhythmia. Most of these studies examine workers who are working rotating 8 hour shifts which are often associated with circadian dysrhythmia." The shift lengths relevant to the mine workers in these matters were around 12 hours long.

140. Fatigue is a complex issue involving individual circumstances and work and private factors. Work issues are varied given the wide range of differing factors in workplaces, including mines, such as the geographical location and it's proximity to the residence of the workers, the size of the workforce, the nature of the operation and hours of work/roster designs. The management of the risk of fatigue from shiftwork, especially in a commuting workforce, needs to be considered within an occupational health and safety framework with flexibility for individual workplace variations. Further, the framework needs to be developed as a result of extensive consultation with employers, employees, regulators and researchers.

141. The evidence given by many workers called during the course of the Inquest suggest that a long distance commute by shift workers to and from the workplace is not an isolated event undertaken by a few in Central Queensland. The evidence of the Police at Dysart was unchallenged and paints a concerning picture of many fatigued drivers at the termination of shift driving long distances and long hours in a state of fatigue potentially putting themselves and other road users at risk. A broad based educational and information program warning workers about the hazard of shiftwork and commuting is in place in the mining industry with a good general awareness of the risk by workers according to the evidence. The decision by the worker to commute seems governed by the need to return home at the end of the shift

roster together with an under-estimation of the risk of crashing whilst driving fatigued.

142. A number of **policing issues** arose during the course of the evidence which will be the subject of comment in order to recommend changes or modifications to existing practices.

143. It is acknowledged that the members of the QPS are very hardworking individuals and that the area of their work involving the investigation of road crashes is a particularly difficult undertaking on a number of levels to which officers apply great skill, expertise, compassion, knowledge and effort in order to determine the cause of crashes, to assist formal processes required as a result of them and to improve public safety. Nothing in this discussion should in any way be taken as critical of individual officers or their dedication to their very difficult work. BMA submitted that there were a number of shortcomings in the Police investigations of these two crashes. It is noted that some of those alleged shortcomings have not been accepted as such in these findings. In most circumstances any shortcomings are as the result of lack of resources, support or training rather than being due to the abilities of any particular officer.

144. **Allocation of Forensic Crash Investigator -** Mr Murdoch for BMA during cross-examination raised the issue with Sergeant Price that he was a colleague and a friend of Senior Constable MacKenzie and gave the eulogy at his funeral service. In relation to the question of whether the allocation of Sergeant Price to investigate the incident was appropriate given that relationship, Sergeant Price gave evidence that enquiries were made with Brisbane as to the availability of an investigator to be sent from Brisbane to investigate the matter but because of the storms and weather on the evening that was not able to be done. Enquiries were also made with the Gladstone District and other areas in an attempt to find an investigator outside of the area to investigate the incident but those enquiries were unsuccessful. As there were no other investigators available, Sergeant Price was detailed to investigate the incident. He was, at the time, one of the most senior and experienced TAIS Officer in the Rockhampton district. BMA challenge the contention by QPS that Sgt Price was the only appropriately experienced officer to conduct the investigation at the time. They suggested that Constable Eastaughffe should have been tasked to conduct the investigation with submission of his findings to a more experienced officer for review. In light of the criticisms of Sgt Price and the conclusions he drew from the evidence he gathered (and the criticism of evidence not gathered), one would assume that the allocation of a less experienced officer would open the investigation to more criticism. The position in which Sgt Price was placed would have undoubtedly been very difficult on a personal level and I consider that he performed his duties to a high standard in difficult circumstances within the resourcing restrictions at the time.

145. **Availability of Forensic Crash Investigators** - There was evidence before the Inquest that there are not sufficient numbers of properly qualified forensic crash investigators in rural and remote areas. There appears to be an effort on the part of QPS to encourage officers to take part in courses in this area. Some officers undertake the basic training and others will undertake further courses and more advanced and specialised training. The experience and qualifications of officers undertaking this work varies greatly.

146. The issue of a dedicated Forensic Crash Unit in the Rockhampton District has been the subject of comment in the earlier Coronial decision of Schibrowski which was referenced in this Inquest. Evidence was given at this Inquest of the proposed establishment of an FCU. Information was received by the Coroner in December 2010 from QPS providing information on Forensic Crash Units in Rockhampton and Mackay. A six month trial was conducted in Rockhampton District from June 2010 to January 2011 with the allocation of two full-time Forensic Crash Investigators co-ordinated by the Officer in Charge of the Rockhampton Traffic Branch. Those positions have been filled rotationally during the trial. An evaluation of the trial by QPS is outstanding. There is no permanent Forensic Crash Unit in Mackay but 14 qualified Forensic Crash investigators are located in the district (there were 13 fatalities in 2010 in the district). My experience is that, apart from the potential for internal benefits for QPS, the trial has not resulted in any significant improvement in the timeliness of the provision of Coronial reports in Rockhampton. Timeframes for the provision of such reports can exceed 12 months.

147. Officers in a FCU investigate fatal and serious road crashes including those where criminal charges might be laid. They also provide guidance and assistance to part time FCU officers in areas where a FCU does not exist, for instance Rockhampton officers assisting Gladstone, Biloela, and Emerald etc. They might also be called upon to review and analyse reports prepared by other officers and provide advice on those reports.

148. The responsibilities for a regional FCU officer are significant as has been seen in these matters. Officers are usually called on at short notice to attend crashes, including fatal incidents. They are often working alone in their task but are reliant on information from other officers and are perhaps required to task others to gather information for them or direct various tasks such as the taking of photographs of the scene. They are usually required to take statements of the relevant witnesses, collect, order and co-ordinate the dissemination of scientific evidence, deal with the grieving families during the investigation and provide specialised and detailed reports to Coroners, prosecutors and senior officers. They are also often required to provide evidence at Inquests and are subject to the rigors of cross-examination. Their reports and methods are subject often to intense scrutiny and, at times,

criticism. In this case experts including a mechanical engineer were called to contest the findings of investigating officers.

149. Part time FCU officers are required to do this in addition to their regular duties, and often times without release from those duties apart from the actual attendance at the scene. They may or may not be adequately trained and resourced to perform the role in the first place. Further investigations, statement taking and report preparation tasks need then to be fitted in around other full-time operational duties or officers need to obtain exemption from operational duties to perform these tasks. This is a difficult and pressure-filled situation for officers to be in.

150. It seems to me that in order for Central Queensland to be properly serviced in relation to the investigation of road crash deaths, a full time FCU needs to be established in Rockhampton and Mackay to service those districts. The Units should have three (3) FCU trained officers, perhaps two (2) permanent (in order to provide stability of staff within the Unit and to allow sufficient time for officers to conduct and complete investigations in a timely fashion) and one (1) position on a rotational basis in order to provide an opportunity for part time FCU officers in the district to keep their skills current. The Units would need to be properly resourced with a fully equipped vehicle, appropriate technical equipment, computers and software. Such staffing could provide the flexibility to cope with shifts, leave, training, court commitments and for the officers to provide advice and assistance to other areas as discussed above.

151. **Vehicle Inspection in Police Investigation** - BMA has submitted that a recommendation be made that QPS consider the retrieval of in-vehicle information recording systems as part of standard investigative procedures for fatal car accidents. Some criticism was made of the Police Mechanical Inspector, Mr Ryan, for not attempting to retrieve data from onboard computer systems of the Mazda. There may be substantial information available, particularly for more modern vehicles, which would assist in investigations. It seems to me that this submission has merit and would not be difficult to implement.

152. **Policing of Fatigued Driving** - Sergeant Price confirmed that there is no offence in relation to fatigued driving in the *Transport Operations (Road Use Management Act)* nor any criteria set down by which a police officer may be able to ascertain whether or not a person is fatigued when they're driving a vehicle. Sergeant Price indicated that from his experience the matter comes down to questioning of the driver, looking at the indicia of the driver and their actions but often it is impossible to tell whether a driver is fatigued. Further, a police officer may look at the driver's manner of driving in relation to the issue of fatigue.

153. It was conceded at the inquest by the Queensland Police Service that their hands are somewhat tied by the *Transport Operations (Road Use*

Management) Act, particularly where there is no demonstrable level of fatigue which can be tested by a roadside devise or other test. In the absence of a reliable testing device for driver fatigue, the only other control presently being used is a log book system such as in the heavy transport industry. This control has proved to be somewhat effective in that industry but the reality of applying such a system across a wider range of drivers is problematic.

154. BMA has submitted that the development of a reliable method of detection of fatigue in a driver would deliver obvious and significant public safety benefits. At present, fatigue as an issue sits in an equivalent position to drink driving in the 1970's before the development of the breathalyser and road-side breath testing devices. In those days, reliance was placed on criteria such as indicia. Mr Foessel gave evidence that in his career as a Police officer policing the road transport industry that various indicators of fatigue were taken into account including glazed eyes, slurred speech, and slowness to answer, manner of driving (lane control, constancy of speed etc). This is a concept that longer serving Police officers will be comfortable with and have experience of. The development of roadside fatigue detection technology is a matter of time and commitment, principally by government in assistance with the provision of funding for research. The utility of an interim procedure during the development of that technology is evident.

155. Police in the Central Region endeavour to address the issue of fatigued drivers by targeting other measurable behaviour such as speeding and drink driving. Traffic enforcement is given a high priority in the Central Region with at least 50% of police patrol activity required to be focused on traffic policing. An intelligence based system called the Traffic Intelligence Road Safety Management System has been implemented in all four Districts of the Central Police Region to aid in the efficient focusing of police resources. According to evidence provided by Inspector Mitchell, traffic policing in general has an effect on fatigued driving. Superintendent Bond considered that high police visibility was the best general deterrent currently available.

156. Police currently have the power to stop drivers for purposes such as conducting random breath tests or other matters but not specifically to check on driver fatigue. There is no specific power to require a fatigued driver of a light vehicle to rest. Evidence was provided by Inspector Mitchell that a general direction may be given under the *Police Powers and Responsibilities Act* 2000 for a driver of a motor vehicle to remain at a given location for the purpose of rest however he acknowledged that the exercise of this particular power in relation to fatigue has not been tested in the courts.

157. Where a fatigued driver departs from the usual standard of driving and such behaviour is observed, the driver may be charged with driving without due care and attention, or, in extreme circumstances,

dangerous driving. Senior Police who gave evidence at the Inquest expressed the view that enforcement action directed at a fatigued driver is difficult without an objective scientific test which is able to be administered in a road side situation to identify fatigue. Legislative support for enforcement action if fatigue is identified in a driver such as specific offence provisions or the power to direct a person to remain at a given location for a period of time to rest is not considered to be in place at present. The stopping of vehicles specifically for a fatigue check presents a number of difficulties. Firstly, there is no current evidentiary test for fatigue and no scientific testing is available. Secondly, Queensland Police Service admit that even if an objective basis for issuing a direction to a driver to remain stationary for a period of time were established questions could still arise as to how long the direction should be given for and where the driver should be directed to stop in addition to concerns that would also arise regarding the safety of the driver. Queensland Police Service submits that whilst the concept merits investigation, operational and implementation difficulties are apparent particularly in relation to the personal safety of a driver of the motor vehicle directed to stop to rest.

158. **Forensic Crash Investigations and the identification of Fatigue as a Cause of Crashes** - The Parliamentary Travelsafe Committee Report stated that police officers receive instruction as part of their initial training in relation to recognising the markers of a "fatigue related crash" as well as the signs of driver impairment including fatigue (Ex 125 Attachment 9). However, Sgt Bellert gave evidence that he received no training, either as a general duties officer or in TAIS training, as to how to categorise or investigate a fatigue related crash. He stated that there was no specific training provided to part-time Forensic Crash Investigators which is focused on the categorisation of crashes as fatigue related. There was no indication of any information about fatigue in Police Operational Vocational Education Program (PROVE), the first year constable training program (Inspector Mitchell's statement Ex 125, Attachment 8) or the Traffic Investigation CAP Module (Feb 2007). Mentorship of junior constables is an uncertain method of providing guidance on fatigue issues. Reliance is placed on the general investigative skills which a police officer gains through their general training and subsequent experience which allows them to subjectively assess a motor vehicle accident and identify whether driver fatigue is a possible causal factor. No objective assessment tools are evident in the material before the Inquest.

159. During the Inquest, the question of the potential development of an investigative checklist incorporating fatigue related issues and the development of an operational definition of fatigue to aid a police officer in identifying fatigue as a causal factor in a motor vehicle accident were discussed. Fatigue may be identified as a causal factor in a motor vehicle accident by a police officer after investigating the relevant circumstances surrounding the incident. Such assessment is by its very nature a subjective exercise in the absence of an objective

definition of fatigue. Both Inspector Mitchell and Superintendent Bond believe that the development of such investigative aids would be helpful. The provision of additional guidance to a crash investigator in relation to the issue of the possible involvement of driver fatigue in a given motor vehicle crash would be useful from an operational perspective.

160. Queensland Police officers have been subjected to significant training in the area of fatigue as it relates to heavy vehicle operation which increases their general awareness of fatigue and its implications. The Crash Investigation course is being updated with a view to addressing driver fatigue in more detail (presently it is included only to the extent of examining the issue in relation to dangerous driving).

161. Until academics and road safety experts can agree on a standardised definition of fatigue upon which appropriate training can be based, the additional training of part-time forensic crash investigators in relation to the identification of fatigue will be necessarily general. In relation to more specialised training in relation to fatigue identification for traffic and general duties police officers, the sheer number of police involved in such training and the extent of the training which would be required would have significant operational impacts on the Queensland Police Service. However the issue of fatigue identification could be included in the training provided to recruits under the PROVE program, in particular the traffic module. The issue of fatigue identification as a causal factor in traffic investigation could also be incorporated into the First Response handbook. The section of the First Response handbook including traffic crash questions would be suitable for inclusion of a line of questioning and investigation relating to fatigue identification in traffic crashes, QPS has submitted.

162. It is further possible for QPS to develop online learning products focused on identification of fatigue as a causal factor in a motor vehicle incident investigation. While an operational definition of fatigue would assist in focusing additional training content in the absence of such a definition, consideration could still be given to supplementing existing training material by incorporating general issues of fatigue identification after appropriate evaluation, including expert consultation if necessary.

163. **Statistics** – The statistical evidence tendered at the Inquest was challenged on a number of fronts but particularly in relation to the use of proxy measures by Queensland Transport. Proxy measures, where they are used, vary from State to State. Professor Haworth noted that around the country, the use of proxy measures to identify fatigue related crashes tended to lead, in some cases, to an over-estimation of the incidence of fatigue related crashes (Ex32 pI). Proxy or surrogate measures are used by Queensland Transport for mass data analysis and are not designed for measuring the exact level of crashes involving fatigue. Currently there does not seem to be any data, apart from that

gathered by QPS with its inevitable subjective variations, which will measure that level.

164. Certainly the overall indications from the statistics is that fatigue-related crashes are a real issue in Central Queensland compared to other regions of the State (29% in Bowen Basin compared to 11.9% rest of Qld 2002-2006). However, due to the problems identified earlier with the reliability of statistics on fatigue related crashes, not only in Queensland but in a comparative sense across the nation, it is difficult to know with certainty the exact parameters of the problem. Further work is needed on the definition and categorisation of fatigue as a causative factor in road crashes, the type of data collected and resultant statistical analysis.

165. Inspector Mitchell was confident in the consistency of the identification of fatigue within Queensland as a possible causal factor across the relevant police regions given the common investigative training provided to police officers. This view has some support from the statistical analysis provided by Mr Stapleton of Queensland Transport at the Inquest. Mr Stapleton indicated that the trend identified by police reporting only, that fatigue related crashes were more prevalent in the Central, North Coast and Southern Police regions was consistent with the trend which arises as a result of the application of the Queensland Transport surrogate measure used to identify fatigue related crashes. Mr Stapleton gave evidence that police identified fatigue related crashes are excluded from the Queensland Transport surrogate figures and as such there is no double counting of the relevant incident. The correlation in general terms identified by both the police reporting and the Queensland Transport surrogate definition in Mr Stapleton's view tendered to reinforce and identify positive aspects of the current police procedure in terms of identifying fatigue crashes.

166. **Data Collection by Police** - During the evidence it was suggested that there was a need to improve data collection relating to driver fatigue as a contributing factor in traffic accidents. The definition of fatigue is essential if the manner in which fatigue as a causal factor in a motor vehicle accident is recorded is to be useful from a statistical perspective. The Queensland Parliamentary Travelsafe Committee supports this view (paragraph 70 of Report Number 43).

167. Professor Haworth noted in her report that the prevalence of reporting of fatigue-related crashes varies between the States as a result of differences in the definitions of fatigue applied across the country. The issue is significant as, for instance, in 2005 in Queensland, 37% of all of the crashes that were identified as fatigue related were actually matters of driver inattention. Further, each jurisdiction relies heavily on Police assessing whether fatigue is a causative feature in a road accident. In most cases, the Police data is the only data available on this issue. The inconsistency across the country due to definitional differences and the subjectivity in the application of those definitions

(due to local conditions, fatigue education and other factors) gives rise to concern over the reliability of the data. Accurate and consistent identification of fatigue related crashes would flow from the development of a list of indicia of fatigue for the use of investigating Police.

168. One means of capturing additional information identified during the course of the Inquest was in the completion of a PT51 form by Police officers. Information contained on this form is entered on the QPRIME computer system which allows the entry of a much greater volume of information than the previous system, used by the Queensland Police Service, and allows for the inclusion of scanned documents and photographs. The PT51 form is generally completed by the First Response Officer and is intended to be completed at the scene of the motor vehicle accident. A number of difficulties arise in seeking to utilise the completion of this form as a means of recording more information relating to the issue of fatigue as a causal factor in a traffic accident. These difficulties include the fact that the investigation into the cause of the motor vehicle accident may not be completed on the day of the incident if relevant information is not immediately available. There is also a limit to how much information can be captured on one form before it becomes too cumbersome to use and correctly completed at the scene of an accident. The form is used as an investigative tool as well as a capture mechanism for some statistical information. A better approach may be to enhance the ability of a police officer to identify driver fatigue as a causal factor in the motor vehicle accident through appropriate additional training as previously outlined.

169. From a researcher's perspective the current data sets available are described as "non ideal". Professor Haworth, when discussing this issue at the Inquest, was of the view that it was unlikely that sufficient resources would be available to train police well across the state to collect better data relating to fatigue on a continuous basis. She suggested rather that an enhanced data collection in a limited geographical area within a certain time frame would be more useful. Such a suggestion is supported by Mr Stapleton of Queensland Transport as a useful tool for obtaining a more robust set of data out of crash evaluation. Professor Smith has provided at the Inquest a succinct list of questions which may be suitable for inclusion as a component of any such trial program. Queensland Police Service has submitted that this concept is theoretically supported and considers Mackay or Rockhampton Police Districts may be an appropriate location for the trial to be undertaken.

170. **Police Resources in Bowen Basin** - Queensland Police Service have submitted (and other parties supported the contention) that increased activity in the mining industry has without question vastly increased the amount of traffic on major roads within the Bowen Basin in recent years including heavy vehicle movements. This trend gives rise to the need

for additional police resources to respond to the increased traffic levels. Evidence was received at the Inquest indicating that staffing increases have been undertaken in the Bowen Basin in response to the increased demand for policing resources including the introduction of a Traffic Branch at Moranbah and additional staff in Emerald, full time traffic intelligence officer position in Mackay District and the establishment of temporary Forensic Crash Units in the Central Region.

171. It was accepted at the Inquest that Police presence on the roads has a powerful deterrent effect on drivers. The anecdotal evidence from witnesses in relation to the Dysart incident was that there was a limited police presence on the roads in that area. Supt Bond gave evidence that the QPS has a staffing model to deal with growth in particular areas, for instance in mining areas, and the model was currently being reviewed by a working party. The model draws on many factors apart from road crash figures. Inspector Mitchell gave evidence that in Central Queensland, traffic police formed 4% of the total Police numbers whereas interstate that level has increased to 6.5% and higher. He considered that Central Queensland needed an increased focus on road patrols, particularly of the highway networks. Sgt McKinnon, the Dysart Police Officer in Charge told the Inquest that he conducted traffic operations when it was possible to do so but that often the other demands on the officers in the station and in town meant that the traffic presence of Police in the area was not what it could be. He believed that an additional officer for Dysart station would enable adequate traffic enforcement and surveillance to take place.

172. It is clear from the evidence that further Police resources may need to be made available in the Bowen Basin to improve public safety in relation to road crashes and a review of current human resources in Central Region would be timely.

173. **Managing the Commute Home in Mining Sector** - Coal mines are required under the legislation to have and implement a Safety and Health Management Plan. Such plans usually include Fatigue Management guidelines or strategies for the enterprise. Norwich Park had such guidelines in place and Blackwater was operating under a draft at the time of the incident. Fatigue management guidelines do not necessarily include consideration of commutes by workers at the conclusion of a roster. Guidelines and testing for fatigue and other performance inhibiting issues (such as drugs and alcohol) at the commencement of rosters and individual shifts are in place to ensure safe operation of workers on the mine site. The same scrutiny is usually not given to activities after the roster for obvious reasons. In some cases, Fatigue Management guidelines provide for information based training for workers to alert them to the dangers of fatigue including driving long distances after roster without rest. Some do not.

174. The CFMEU have submitted that one of the clear issues in relation to the enforcement and implementation of a fatigue management policy across industry is the deficiency in the current system relating to the implementation of plans. Draft policies can take inordinate amounts of time to be integrated into the health and safety management system of a mine. There is often no interim measure to ascertain the effectiveness of the draft or working fatigue policy which is in place pending the finalisation of that policy into the health and safety management system. The union is concerned that there needs to be an interim policy put in place to ensure that there is a standard against which any operational fatigue policies can be measured.

175. Individual environmental factors pertinent to any mine means that a generic policy across the board may be impractical but the Union feels strongly that there needs to be a standard by which an individual employer's performance can be gauged. They have proposed that a generic fatigue management plan (drawing on a number of fatigue policies and which was presented to the inquest for further discussion and ratification with the Queensland Resources Council and other interested bodies) should be reduced to a Recognised Standard under the legislation for this purpose.

176. The Union has proposed that an operational definition of "fatigue" could be developed having reference to the maximum number of shift hours based on a day, a week, a shift cycle, and a gross shift length (hours of work plus travel). It is important for these purposes that as workers are travelling to return to their home at the end of a rostered period, that the geographical distances and travel times need to be taken into account in relation to any fatigue policy. The union maintains it would be dangerous and artificial to exclude commute time from shift lengths. Further the union argue that it is incongruous that the trip to work be treated any differently to the journey home. The union considers it unacceptable that controls even in the employment contract or under the fatigue management policy which is binding on an employee, can compel a worker to attend fit for work for instance by arriving for a shift early enough to sleep before commencement of the shift, where there is very little control or a soft control at best put in place at the termination of the shift/cycle, for instance by way of direction to an employee to take appropriate rests on the journey home.

177. Professor Dawson commented on the incongruence of such an approach (which appeared to be a question of will rather than capacity on the part of employers) to manage safety risks on the journey home. Professor Dawson stated in evidence that the journey home should be part of a **risk assessment** process for the employer in managing fatigue. He stated "*It's absolutely critical to assess the impact of commutes because they effectively … extend the work period in that they reduce the opportunity for sleep… the question of how best to manage that is really complex … and you have to be really careful … and look at the overall system of work and how (the controls) will be*

managed" (Day 2 p8-9). In relation to the disparity between employer controls of conditions at the beginning and end of shifts, Professor Dawson stated "*This reflects one of the key issues in terms of managing fatigue is that up until recently its been managed primarily as an industrial issue and not as a safety issue. So, therefore, it's seen as it's negotiable. My view would be the same as many other safety professionals is that safety is safety and it's not negotiable in an industrial sense, but, that change takes time*." (Day 2 p9 line 20-27)

178. The Union acknowledges that whilst it might be unpalatable to some workers to be instructed on what to do on the journey home, there should be acceptance that the obligation is upon an employer to ensure that the workers arrive home safe from work and that the employment contract should cover the journey home.

179. Various efforts have been made at some mines to address this issue through control measures. Ms Luck gave evidence that Mr Wilson had previously worked at a mine which had bussed workers to and from accommodation each shift. Evidence was received that approximately 67% of mines have a bussing policy in place and that buses were used by significant portions of the workforce in those situations. Associate Professor Di Milia considered the use of bussing would go a long way to address the issue. Bussing is clearly one control measure which could be used as one of a number of solutions to address the risk of the journey home from fatigue. It is acknowledged however that in some circumstances such a policy may be very effective but in others it may not. It is clear that bussing can be an effective control measure but there are many issues impacting on bussing as a measure which need to be analysed and considered. Others control measures may also be available.

180. The advice provided to the court by professional witnesses and the experts in this domain is that a **risk assessment approach** should be employed to consider appropriate controls to ensure the risk to the workers and the public is at an acceptable level.

181. David Reece noted (Exhibit 31 page 13) –

"There has been a substantial amount of time, money, expertise and effort expended to date within the mining industry to address the impact of hours of work and fatigue in the achievement of safe operation. There is and will continue to be room for improvement regardless of the many excellent initiatives that have been and that may yet be developed and implemented.

The powerful notion of the Hierarchy of Control as considered in risk management will provide some assistance and direction to the improved response to this issue. There is scope for additional controls at each level of the hierarchy – administrative control such as information, training and monitoring; engineering controls such as

improved roads and separation of vehicles and substitution controls such as alternative means of transport or the use of closer accommodation to sites. To achieve this result will require a consistent and collaborative approach by employers, employees, regulators, industrial organisations, government and the wider community."

182. Associate Professor Naomi Rogers (Exhibit 32 pages 13 to 14) stated that –

"The problem of fatigue and fatigue management needs to be a shared one. It needs to be shared by the industries involved with shift work (including the unions), the companies involved in shift work (including board members, management, and employees), families and friends of workers and by others who may be impacted by fatigue, including emergency workers, health professionals, legislators.

When developing and implementing Fatigue Management Systems it needs to be done in an environment of open discussion and cooperation and needs to take into account current best practice, where possible established by evidence-based recommendations. Fatigue Management Systems also need to be dynamic and evolving as new information, techniques and strategies become available. As such there should be a mechanism in place whereby they can be regularly reviewed and updated when needed."

And further –

"At present there are no consistent Fatigue Management Systems in place across the mining industry. While some sites appear to be quite proactive with their development of Fatigue Management Systems, others appear to be engaged only in the minimum required. This is in contrast to what is in place in many other industries, such as the rail industry, where there is a national recommendation for the management of fatigue across different companies and organisations.

There is a need for the establishment of evidence-based, efficacious and appropriate fatigue management systems in the mining industry, and for these to be adopted by all relevant mines and organisations. There is also a need to firmly establish what is meant by fatigue and what the acceptable levels of fatigue are? How high is too high a level of fatigue? Are there safe levels of fatigue? Does it depend on the type of work the individual is involved in? What are the contingency plans?

Given that other industries have started to address some of these issues, it may be valuable to seek guidance from people involved in the development and implementation of Similar Fatigue Management systems to assist with the development of the most appropriate system for use in mining. In addition, a range of individuals with expertise in various areas of fatigue management and facilitating significant

changes within a working environment may be useful to consult with. Also, deciding on the nature of the fatigue management, and resultant changes to current workplace environments, other experts, for example in the delivery of education, may also be useful to consult.

Given the potential widespread impact of fatigue and fatigue management, other stakeholders who have a significant interest and may provide feedback and assistance, and also require some educational knowledge of the new systems in place should also be consulted. These should include the Queensland State government, Queensland Police Service, the Department of Mines and Natural Resources and the families of workers."

183. The court appointed expert, Professor Smith, notes the importance of a risk assessment approach in his report (Exhibit 148) as well as the need for public infrastructure in the Bowen Basin to support industry. In his evidence (Day 31 page 14) he re-enforces the advice of the professional and expert witnesses in stating –

"We've clearly seen that – in terms of the expert witnesses – that the recommendation for a rigorous assessment of the hazard, a management of that hazard, a management plan for that hazard that truly addresses that hazard and then a monitoring of the impact of adopting that plan, an auditing so that we can see it actually is being adopted. That's an actual research exercise that should be monitored so those are key field areas of research that I think are necessary."

Professor Smith also noted the importance of including stakeholders such as road users in the risk assessment process (Day 30 pages 38 to 39).

184. Professor Dawson takes a more robust view favouring a legislative solution. He stated (Day 28 page 19) –

"There should be very clear regulatory and legislative requirement to have a fatigue management plan and that should be enforced strongly, but that we accept the fact that the solutions are complex and that we enable organisations to develop their own safety case to present to the regulator on, 'Here's how organisation X is going to manage fatigue.' But then I think the community has a responsibility to ensure that what the organisation says its doing is actually what's happening in practice on the ground every day. So I'm up for very clear enforcement of the requirement to have a Fatigue Management Plan, but what I'm also very strongly saying is that I don't think the idea of handy hints or guidelines are useful unless there is actually a clear requirement for you to have a plan and that will be looked at and audited, but we accept the fact that at the local level your solution may be different to the mine down the road or the transport operation down the road because of the unique risk profile of your organisation. And I think that its that combination of very strict regulatory oversight but local flexibility

that provides the best outcome, and we can see that in many examples around the world and around Australia in other areas where we are going for increase requirement to manage fatigue, but flexibility on how you do it, and I think that's going to be the best way forward."

185. The issue of controlling the risk associated with work related commuting within a shiftwork population is a complex one and is clearly a matter directly linked to public safety as well as reducing or preventing future deaths from occurring in circumstances similar to the present matters. Comments made here will not seek to be prescriptive of solutions but rather attempt to promote appropriate moves towards improvement of public safety generally through this issue.

186. **Fatigue Management Forum** - Fatigue in drivers is a community issue and is not limited to the mining sector. Professor Dawson gave evidence that forum based approaches to the development through consultation of fatigue management guidelines have been very effective in Australia and overseas. The gathering of the necessary expertise in the forum and collaborative development of a plan can ensure a reasonable outcome. BMA have submitted that such an approach across road user sectors would be beneficial in Queensland to address the issue. All of the professional witnesses before the Inquest agreed on the utility of this proposal.

187. The Forum should aim to establish best practice fatigue management guidelines for government and industry across the State including the development of a definition of fatigue, review the extent of fatigue related crashes and the causes for them, the effectiveness of fatigue management standards across the State (including the Qld Resources Council "Fatigue Management Principles" Ex104) in addressing the causes of fatigue related crashes, development of benchmarks for measuring the effectiveness of the standards and practices, determination of how existing standards and practices can be improved, and review of the most effective ways to reduce the incidence of fatigue related crashes.

188. **Journey Claims** - One of the reasons why workers who gave evidence at the Inquest indicated that they did not rest before travelling home was that there was some concern in the industry that they would not be covered by appropriate workers' compensation insurance if there was a substantial deviation in their journey, for instance to have a sleep at a location separate to the mine site prior to commencing their drive to their home base. A response was sought from WorkCover Queensland in relation to this issue which indicated that each matter would be judged on a case by case basis if an application for compensation was made in those circumstances. This issue obviously needs to be resolved and workers affected informed of their legal position. It is obvious that appropriate rest before commuting travel is a safety issue which should not adversely impact a worker's insurance

rights.

189. **Fatigue Management Education in the Workplace** - It is essential that Fatigue Management education in the workplace is competency based training including assessment of workers by qualified trainers to demonstrate competency in the content. This is more effective than awareness training which is generally the current approach to this issue. Professor Dawson suggested in evidence that the training could be done on the basis of a 'fatigue ticket' with the curriculum including a workbook requiring the worker to solve typical scenarios which create fatigue related risk. This issue would be within the province of the Ministerial Advisory Council to consider and implement.

190. **Condition of Dysart-Middlemount Road** - Mr Herring stated that the Dysart-Middlemount Road was fairly typical and was similar in construction to many roads in Central Queensland. The most recent figures he had access to for traffic flow indicated that the flow was classed as "light volume". 3.4% of the flow was articulated vehicles. Mr Herring was unable to say whether the road had originally been constructed with the type and volume of traffic which travelled on it in mind. It would be reasonable to conclude that there is more and heavier traffic on this road that at the time of construction in 1979.

191. Workers and mine staff had complained about the roughness of the road in general and a number of specific sites on the road with particular problems. Pavement reconstruction for part of the road was scheduled for the financial year in which the collision occurred. Upon perusing the records, Mr Herring considered that there were a number of maintenance issues which should have been identified by Broadsound Shire Council, including the edges and shoulders, and that warning signs for motorists as to the condition of the road would have been advisable.

192. Main Roads have submitted that the condition of this road is fair. It is conceded that the road is rough (to 160 roughness counts) but maintenance over the life of the road has sustained the surface it is submitted. The edge drop off is within acceptable levels and the width of the seal is the same as at time of construction at around 6.4 metres. Further spending is earmarked for enhancement and maintenance of the road (along its length and not just in the area of this accident) is planned in the next three years. The road will continue to be monitored on a state-wide priority ranking basis. Regular safety audits are carried out on roads in accordance with the Austroads Road Safety Audit Guide (2002) and using safety assessment tools to identify hazardous areas of road. Planning is conducted on a State-wide basis and programs of work carried out under performance contracts. Rigorous processes are applied to ensure that roads are routinely inspected and maintained to the highest standards possible within existing funds. Further, roadside amenities (rest areas) are a consideration within road safety management and are aimed at reducing fatigue related

accidents. Co-ordinated promotion through programs, signage, maps and brochures and marketing bring those amenities to the attention of the driving public.

193. BMA submitted that there was compelling evidence strongly suggesting the need for remedial work and further extensive upgrade and widening works on the road in the interests of public safety. Witnesses commented on the narrowness and unsafe condition of the road. Photographs tendered during the Inquest show the condition of the road in particular the state of the edges of the bitumen and shoulders. The evidence was that drivers tend to drive towards the middle of the road to avoid the edges and rutting, leaving little margin for error between oncoming vehicles. Rutting and fault lines in the road also have the potential to affect the steering of small vehicles especially in wet weather with water pooling in some areas of the road. The narrowness of the road prohibits the possibility of audible lines or fog lines as there is insufficient width in the road. The Department of Main Roads recommended that the road be widened by a metre in each direction between Dysart and Moranbah. The Monash University study tendered at the Inquest found that road design is a major contributing factor in rural road crashes. The findings in the Dysart collision are that the condition of the road was a contributing factor.

194. It has also been submitted by BMA that due to the significant increase in road traffic in the Central Queensland region in recent years and the evidence that this road is typical for the area, that a CQ-focussed **road safety committee** be established comprising of Main Roads, QT and QPS and agricultural, transport and mining industry bodies to conduct ongoing safety reviews and engineering audits of CQ roads particularly those servicing mines, mining towns and regional centres to allow for more targeted road safety audits, maintenance and upgrade processes. It was submitted that a portion of Mining Royalties could be used to fund the committee. A number of issues were suggested in submissions, most of which are really outside the parameters of the considerations here but are nonetheless valid. Mr Douglas from Main Roads gave evidence that he was unsure as to whether this road had even been audited and suspected that no risk assessment had been conducted on the portion of road where the accident occurred.

195. **Public Education** – In relation to fatigue, there has been a continuous effort by government and other organisations by a number of means to keep the dangers of driving fatigued in the public consciousness. Obviously public education is an important tool in improving public safety on the roads and needs to continue to develop its reach and effectiveness. Professor Dawson gave evidence that public education campaigns targeted at increasing awareness of the need for a certain amount of sleep (5 hrs in 24, 12 in 48 etc) would be beneficial in helping people by giving them boundaries within which to assess their own risk before driving. A number of other issues were highlighted by Professor Haworth relating to targeting issues and aiming to change

attitudes and behaviour. She also recommended that family members of workers at risk of fatigue to become involved in the issue and ensuring that expectations are not created which encourage risk-taking, and in improving off-duty fatigue awareness at home. Snr Sgt Lang of the RAAG Group considered that children, parents and partners of workers need to be involved in education campaigns on fatigue issues.

RECOMMENDATIONS

I thank the parties for the submissions made regarding recommendations which were of significant assistance. I have adopted some of the recommendations proposed in those submissions.

I make the following comments by way of recommendations pursuant to section 46 of the Coroners' Act to assist to prevent similar occurrences in the future and in the interests of public safety on the roads. To the extent that the parties have already taken remedial action, the court expects that those actions are bona fide and implemented long term.

IT IS RECOMMENDED:

1. That Queensland Police Service conduct a review of the allocation of Traffic Accident Investigation Squad (now Forensic Crash Unit) officers to Regional Queensland. In particular, that a permanent Forensic Crash Unit be established in Rockhampton sufficiently resourced and staffed to ensure timely investigations of fatal and serious road crashes taking into account the issues commented on in this Inquest.

2. That Queensland Transport and Queensland Police Service review:

   (a) Police traffic accident documentation, training manuals and the First Response Handbook to promote the accurate recognition and recording of fatigue-related crashes; and

   (b) current basic training and the Forensic Crash Unit specialist training syllabus in order to ensure comprehensive training for traffic and general duties officers who attend crashes. Such a review should include a focus on specific training to assist in identification of fatigue-related crashes and the detection of drivers who are impaired by fatigue;

   (c) in consultation with appropriate fatigue experts and or road safety experts, the current crash data collection forms (PT51) to consider the development and inclusion of a list of extended categories and enquiries required for classification of crashes by police as being fatigue related for use as an aide memoir in operational field conditions.

3. That an urgent review be undertaken by the Minister for Police, Corrective Services and Sport and the Queensland Police Service of the current police resources and police number allocations in the Central Region. Priority should be considered for the provision of additional police numbers and resources to assist in bolstering policing presence on Central Queensland roads with a view to increasing the effectiveness of current enforcement activities, road surveillance and fatigue monitoring in light of mining activities in the Region.

4. That Queensland Transport in conjunction with the Queensland Police Service undertake a review of current crash data collection procedures, classification of fatigue, the veracity of the surrogate measures, and methodologies for the analysis of crash data by the Queensland Police Service and Queensland Transport in association with appropriate external experts.

5. That Queensland Police Service conduct a trial within a limited geographic area for a set period of time to collect enhanced data on fatigue-related road crashes as discussed in these findings.

6. That a Memorandum of Understanding be negotiated between Queensland Police Service and the Mines Inspectorate to notify the Mines Inspectorate of the road crashes where persons are travelling to and from a mine to enable the Mines Inspectorate to investigate at the mine in relation to the effectiveness and compliance with the health and safety management system and for the sharing of information for the purpose of an investigation by either entity.

7. That Queensland Transport in conjunction with the Queensland Police Service should review and adopt an operational definition of fatigue.

8. That the Queensland Police Service consider retrieval of in-vehicle information recording systems as part of standard investigative procedures for fatal car accidents.

9. That ongoing consideration be given by Queensland Police Service to:

   (a) creating specific powers for police to stop drivers suspected of being fatigued; and

   (b) the development of a fatigue-specific driving offence, and, in the meantime;

   (c) the utilisation of additional investigative techniques to establish fatigue until such time as appropriate fatigue detection methodology is available.

10. That the Queensland Government through Queensland Transport and Queensland Health Commission or other appropriate bodies

support/develop further research into a method or mechanism for the detection of fatigue impairment in drivers.

11. That additional effort be committed to improving the quality of data maintained by Queensland Transport and obtained by Queensland Police identifying the location of fatigue hot spots on the roads so that engineering initiatives and other control measures to combat fatigue-related crashes might be considered for continuing deployment throughout Queensland in these identified zones.

12. That the Minister for Transport and Main Roads seek the support of all Australian Transport Councils (ATC), Members for the development of a standardised fatigue definition and reporting for road safety purposes.

13. That a Fatigue Management Forum be convened to develop best practice fatigue management guidelines for road transport authorities, road users and public and private sector employers across Queensland. The guidelines should address the development of a definition of fatigue, review the extent of fatigue related crashes and the causes for them, the effectiveness of fatigue management standards across the State (including the Qld Resources Council "Fatigue Management Principles") in addressing the causes of fatigue related crashes, development of benchmarks for measuring the effectiveness of the standards and practices, determination of how existing standards and practices can be improved, and review of the most effective ways to reduce the incidence of fatigue related crashes.

14. That the matter of fatigue be referred to the Ministerial Advisory Council (MAC) for the Council to consider –

    (a) the appropriateness or otherwise of "competency based" fatigue training for the mining industry; and

    (b) any other measures considered appropriate by the Council to further enhance the mining industry's contribution to fatigue management.

15. That the Mines Inspectorate investigate:

    (a) the implementation of a fatigue management Recognised Standard incorporating a workable definition of fatigue including consideration of parameters for maximum number of hours in a day, a week and a shift cycle; and if so then

    (b) enforcement powers be implemented either within a statutory framework or the employment contact or both to ensure compliance with the fatigue management standard on the shoulders of the employer and the employee.

16. In order to ensure a whole of government response to the occupational health and safety issue of shiftwork and commuting across all the industrial sectors the Queensland Transport, in conjunction with the Division of Workplace Health and Safety and the Mines Inspectorate, review the current regulatory framework, standards and guidelines to identify risks to workers and the public from shiftwork, commuting and fatigue to ensure the legislative framework manages risk at an acceptable level and make a formal reference of the issue to a joint session of the Coal and Metals Advisory Councils.

17. That mine operators fully explore control measures to reduce or eliminate the risks associated with workers commuting whilst fatigued.

18. That the Mines Inspectorate sponsor, in conjunction with the Queensland Resources Council and the CFMEU, targeted research at both the industry and mine level into shiftwork fatigue risk management and commuting to ensure risk is at an acceptable level.

19. To remove doubt the Department of Industrial Relations and Q-Comp should review the current rules for journey claims to ensure clarity and cover for fatigue-reducing rest breaks before commuting on public roads to make it clear that a worker who is complying with a Fatigue Management Policy which comes under the Health and Safety management system of the mine is covered in the event of a journey claim.

20. That a Central Queensland Road Safety Committee be established to conduct ongoing safety audits of road surfacing to Central Queensland mines, mining towns and regional centres and that consideration be given to funding the Committee through existing mining royalties.

21. That a comprehensive audit be engaged in by the Department of Main Roads and Queensland Transport of Central Queensland roads to consider the appropriateness and risk posed by existing road width, road shoulders, the need or appropriateness of road signage, adequacy and/or need for additional rest areas and identification of fatigue zones where additional fatigue counter-measures might be considered.

22. That the Dysart-Middlemount Road be prioritised by Department of Main Roads for road upgrade and road widening between Dysart and Norwich Park.

23. That Queensland Transport and the Queensland Police Service in conjunction with suitable road safety organisations (such as RAGG and MIRSA) and taking advice from fatigue experts review existing public education campaigns on driver fatigue and develop and implement new

public education campaigns on driver fatigue and driver inattention to improve effectiveness of the campaigns.

24. That the Queensland Government prioritise initiatives to address fatigued driving as a critical public safety issue.

Delivered on 23 February 2011
at Rockhampton

A M Hennessy
Coroner