

SOUTH



AUSTRALIA

## FINDING OF INQUEST

*An Inquest taken on behalf of our Sovereign Lady the Queen at Adelaide in the State of South Australia, on the 1<sup>st</sup> day of March, 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup> and 13<sup>th</sup> day of April, and 4<sup>th</sup> day of August, 2000, before Wayne Cromwell Chivell, a Coroner for the said State, concerning the death of Trevor Wayne Coppins.*

*I, the said Coroner, do find that Trevor Wayne Coppins, aged 41 years, late of 47 Company Street, Semaphore, died at Alta Crescent, Stirling on the 25<sup>th</sup> day of February, 1998 as a result of closed chest injuries. I find that the circumstances of death were as follows:-*

### 1. **Background**

- 1.1 Trevor Coppins was employed by a firm known as Challenge Recruitment Pty. Ltd. That company hired his services as a plant operator to Boral Resources (S.A.) Ltd. through their subsidiary, Boral Asphalt, of 69 Mooringe Avenue, Plympton.
- 1.2 Mr. Shane Graham, the State Manager of Boral Asphalt, told me that Challenge paid Mr. Coppins his wages, and then invoiced Boral for his services (T.112).
- 1.3 There is some evidence, in the form of a diary note, which suggests that Mr. Coppins underwent an induction process on 21 October 1995. Mr. Graham said that this would have included:-

“An element of generic induction which would have looked at issues of housekeeping at the site, where the toilets were, where the lunchrooms were, where the various offices were. There would have been an element of site-specific safety induction and there would have been an element of general site induction”. (T.123-4).

This evidence is, of course, speculation on Mr. Graham's part. He was not employed at Boral Asphalt in South Australia at the time, nor is there any record as to the content of the induction process, nor indeed a specific record indicating that Mr. Coppins took part.

- 1.4 The records kept by Boral are unsatisfactorily scant in this regard. This is an important issue - an employee should be introduced to the workplace properly, and given a comprehensive safety induction before starting work. This process should be properly documented, and verified by those taking part, including the employee.
- 1.5 In any event, by February 1998 Mr. Coppins had worked at Boral Asphalt for more than two years, and possibly longer (T.124).

## 2. **Events of 25 February 1998**

- 2.1 On the day of the accident, Mr. Coppins was driving a Pacific 33TC multi-tyred road roller Registered Number VRD-349 owned or operated by Boral Asphalt. Its Boral number was 231. The machine was manufactured in 1973 (Exhibit C.20b, p1).
- 2.2 Roller number 231 and another one were conveyed to the general area of the worksite on the morning of 25 February 1998 by Shane Rushton, an employee of Boral Transport. Mr Rushton loaded and unloaded both rollers during this process. He said:-

“I do not recall any problems with the brakes or gears on either roller”.  
(Exhibit C.9c, p2).

Although Mr. Rushton gave contradictory statements about when he loaded the rollers on to the low loader (Exhibits C.9a and C.9c), I have no reason to doubt his evidence quoted above.

- 2.3 Mr. Rushton's evidence is to be contrasted with that of Mr. Cosimo Franze, a plant operator who said that when he arrived at the worksite that morning, Mr. Coppins told him that the roller jumped out of gear as he was unloading it (T.59). On the evidence I have already mentioned, Mr. Coppins did not unload the roller, Mr. Rushton did.

2.4 Mr. Franze also said that, later in the morning, Mr. Coppins told him that the brakes on his roller were not working. He said:-

“Yes, as I was coming back backwards, he was going forwards you see. Trevor said to me ‘Geez, are these brakes supposed to stop you or what?’ and I said ‘Yes they should’. He reckons ‘Have a look at this’. He stopped then but he reversed back to prove a point to me, he reversed back probably about one or two metres and then he put it in gear to come forwards. As he did he said ‘Just have a look at this’ and he put his foot on the brake really hard and he jumped off his seat and the roller really wasn’t stopping. It was but not in a way that any braking system should operate, and he actually hit the back of my roller’. (T.60-61).

He added that they agreed that he would drive his roller behind Mr. Coppins’ roller in case it jumped out of gear again (T.63).

2.5 I have considerable doubts about the veracity of Mr. Franze’s evidence. He said that, after he demonstrated the brake failure, Mr. Coppins just “laughed it off” (Exhibit C.25, p2). The machines were operating in quite hilly country at that time, and the risks inherent in driving an 11 tonne machine without brakes must have been obvious. Mr. Franze’s assertion that all their work that day was “uphill” (T.87) is plainly ludicrous. Mr. Graham retraced the roads worked on that day, and demonstrated that the men were working in quite hilly terrain at several locations (T.108-110).

2.6 It is likely, in view of other evidence which I will discuss later that the machine Mr. Coppins was driving was jumping out of gear. However, I do not accept that the braking system had failed earlier in the morning, as alleged by Mr. Franze.

## 2.7 The accident

The events leading up to Mr. Coppins’ death can be described by quoting from the statement of Kent Adair, a fellow employee of Boral Asphalt. Mr. Adair said:-

“After lunch myself and the road crew went to Alta Crescent to prepare the street, spray it with bitumen and then cover it with stone. Alta Crescent runs into Vista Terrace. We commenced work at the bottom of Alta Crescent, progressing partially up the hill to the junction of Vista Terrace. During this time I was on traffic control. When the road had been sprayed along its length and the stone had been layed on, I walked up the road to get a drink and find out what to do next. While walking up Alta Crescent I noticed the multi roller, with Trevor Coppins operating it, sitting in the left hand side of the machine, reversing towards me. I then noticed a build-up of material on the wheel of the roller, but I cannot remember which wheel.

At this stage I was approximately 10 metres from the multi roller. As I got closer to the roller I said, 'stop the machine', so I could clear the wheel. When the roller was close enough to me I bent down and said, 'stop' again, at this time I was approximately 1 and a half metres from the edge of the road. I looked up again because the roller was not stopping and I noticed Trevor Coppins pumping the brake pedal, and the roller was still reversing. I then jumped out of the way and yelled out to Trevor to jump as there was a steep embankment at the edge of the road. When I jumped clear I noticed Trevor was standing up on the left hand side of the roller ready to jump. Just then the roller tilted to the left side as it went over the embankment so Trevor did not jump, as the roller may have rolled on top of him. I then noticed Trevor was thrown back into the seat of the multi roller and the whole roller fell over the embankment. Once over, it kept going, missing several trees and clipped the eaves of the house located below the road, and came to rest on the edge of another drop at the rear of the house. I then went down the hill to help Trevor and yelled out to the supervisor, Larry Brandon, to call an ambulance. The owners of the house came out and I told them to also call an ambulance. I was first at the accident scene and noticed that Trevor was sitting in the seat of the roller. I jumped on to the roller and tried to render assistance - I noticed his right arm was badly broken and that Trevor was in a bad way. Shortly after, the police and ambulance arrived and I went back up to the road. In my opinion the brakes did not stop the roller from going over the edge of the road. When I reached the machine I noticed that the reverse alarm was sounding, indicating the machine was in reverse". (Exhibit C.23, p1-2).

2.8 Mr Adair said that the roller was only travelling slowly down the hill. He said in evidence:-

"Yes I put my hand up at first, as a stopping indicator and he knew what I wanted, so he started attempting to stop and then it's all irrelevant, the damn thing didn't stop. I looked up and there he was pumping the brakes and I say, he was pumping the brakes. The machine should have stopped. He was going - like I could walk faster than what that machine was actually travelling; in fact I was just about ready to go down and start cleaning it because I really thought this thing was going to stop. Then I looked up and I saw Trevor just pumping the brakes like hell to try and stop it and it didn't stop. That's when I just yelled out 'Jump'". (T.31 - see also T.40).

Mr. Adair described the slope on Alta Crescent as "steep" (T.39).

2.9 Mr. Adair said that the roller was probably in no higher than second gear as it came down the hill. He said that it would probably have been in first gear if he had been driving (T.43).

- 2.10 There were a number of other eye-witnesses to the accident, including Jack Jordan-Bulmer, who was 11 years old at the time (Exhibit C.6a), Mrs. Dawson, who was the owner of the house with which the roller collided (Exhibit C.7a), and co-workers Trevor Ward (Exhibit C.8a), and Larry Brandon (Exhibit C.15a). These witnesses all gave statements similar to that of Mr. Adair.
- 2.11 After the accident, Shane Rushton confirmed that the braking system on roller number 231 was no longer functioning. He said:-

“As I placed the vehicle on the float, I could feel that the braking function/efficiency was virtually nil, which was totally opposite to what it was like that morning when I unloaded the vehicle”. (Exhibit C.9c, p3).

### 2.12 Treatment

Dr. W.M. Griggs, Head of the Trauma Unit at the Royal Adelaide Hospital, attended at the scene of the accident at about 5.05p.m. He performed bilateral needle thoracostomies, and inserted chest drains, which produced “frank blood”. He transfused blood, but Mr. Coppins continued in asystole (no heart output). Dr. Griggs then performed an open thoracotomy (surgical opening of the chest cavity) and found air under tension and blood and abdominal contents consistent with a ruptured diaphragm. Despite further intensive efforts at resuscitation, including internal manual cardiac compressions, Mr. Coppins could not be revived and further attempts at resuscitation were discontinued at 5.40p.m. Dr. Griggs pronounced life extinct at that time (Exhibit C.2a, p2).

## 3. **Cause of death**

- 3.1 A post mortem was performed on the body of the deceased by Dr. R.A. James, Senior Forensic Pathologist, on 26 February 1998. Dr. James diagnosed the cause of death as “closed chest injuries”. He confirmed that Mr. Coppins had suffered a ruptured hemi-diaphragm on both sides with displacement of the liver into the chest cavity. He said that this “appears to be the explanation for his respiratory failure” (Exhibit C.3a, p4).

3.2 Although it cannot be clearly established, the evidence of Mr Adair suggests that Mr Coppins received a fatal blow to the chest either from a tree branch or from a wooden beam, part of the pergola attached to the house near where the roller came to rest (T56).

#### 4. **Investigation**

##### 4.1 The braking system

On 27 February 1998 Mr. Ken Bulmer, the owner/manager of MacPac Sales and Service Pty. Ltd., and a man with very long experience with the braking systems of heavy equipment, inspected roller number 231.

4.2 Mr. Bulmer found that brake fluid had been leaking into the rubber diaphragm which preserves the vacuum in the brake booster unit. On initial inspection of the diaphragm he did not notice anything, but after replacing the unit, he took it apart again and then detected a tear or split in the diaphragm through which a finger could pass.

4.3 This defect would have allowed air to pass from one side of the vacuum tank to the other, rendering the booster unit useless, since it could not maintain a vacuum.

4.4 Mr. Bulmer found that the rest of the braking system on the vehicle was in good working order (Exhibit C.20b, p2).

4.5 The braking system on the roller had been extensively serviced on 27 April 1997, less than twelve months earlier. Mr. Stephen Portlock, the Branch Operations Manager for Truck and Car Brake Service, the company which performed the service, described it as “major” (T.198).

4.6 Mr Portlock said that the diaphragm should have been checked during the service, but not necessarily replaced (T201). He said the system should be serviced at least annually (T203), so no criticism of Boral is warranted on the basis of any failure to do so.

4.7 Mr. Portlock said that it was unlikely that the hole Mr. Bulmer found in the diaphragm happened gradually. He said:-

“I have never seen a small hole and normally the split occurs instantly. I have never seen a small hole get bigger, ever ... I have seen probably hundreds over the years and they’ve always got a reasonable split in them, always”. (T.204).

4.8 Since it cannot be predicted with certainty when such a failure will occur, this case demonstrates that some fail-safe or back-up braking system on such vehicles is called for. Mr. Portlock suggested that a “split” system should have been fitted, whereby two separate braking systems operate, so that one system provides a back-up if the other one fails. Additionally, a “spring brake” should be fitted, so that in the event of a loss of vacuum the brakes will lock on and cannot be released until vacuum is restored. The same principle applies to the more modern hydraulic systems as well (T.205).

4.9 I was told that most heavy road-building equipment is now fitted with such safety devices. Mr. Portlock said:-

“Probably since the death of Trevor, it seemed to make everybody stand up and take notice”. (T.207).

4.10 It seems to me that all heavy road-building equipment should be fitted with back-up or fail-safe braking systems as I have described. I will recommend, pursuant to Section 25(2) of the Coroners Act, that the Minister of Transport consider how this might be implemented.

4.11 The gearbox

There is a considerable body of evidence before me that roller number 231 had a history of jumping out of gear. Mark Tierney, now a foreman at Boral Asphalt, said that Peter Watson, an operator, complained about this to him in late January or early February 1998. He test-drove the vehicle and confirmed the problem, and so he took the machine out of service immediately (T.91). When the replacement machine did the same thing the next day, that was also taken out of service (T.92).

4.12 Mr. Watson’s statement suggests that the machine was jumping out of first gear. He said:-

“I was working in Deepdene Avenue, Bellevue Heights doing a spray and seal on the road. There was a bit of a gradient on that road and it was while I was reversing down the hill in first gear that it jumped out of gear. When the machine jumps out of gear it starts to free wheel. At that time all I did was put my foot on the brake and I had no trouble stopping. While reversing my speed was about walking pace”. (Exhibit C10a, p1-2).

- 4.13 Mr. Tierney's recollection was that the roller jumped out of second gear (Exhibit C.11a, p1).
- 4.14 This evidence is consistent with the evidence of Mr. Graham Keech, a fitter contracted to Boral Asphalt through Challenge Recruitment. His diary (Exhibit C.14c) confirms that he worked on roller number 231 on 11, 12, 13 and 16 February 1998 for a total of twelve hours. He said that he had been told that the vehicle had been jumping out of gear, and he drove it around the yard but was unable to reproduce the fault (Exhibit C.14a, p1).
- 4.15 Mr. Keech removed the gearbox cover, and found that a "detent spring" on the selector shaft for the third and fourth gears was broken, so he replaced it. He did not test the vehicle after his repairs (Exhibit C.14a, p2). It seems surprising that this work required twelve hours, as recorded in Mr. Keech's diary, and yet he did not have time to test the vehicle afterwards to ensure that his repairs had been successful.
- 4.16 Mr. Keech said that he would have been able to see the third gear when he removed the gearbox cover, but he did not notice that the teeth were worn (Exhibit C.14a, p3).
- 4.17 Clearly, Mr. Keech deserves criticism for not testing the vehicle after it was repaired. No more than two days later, the roller was jumping out of gear again. The statement of Graeme Baker, plant operator, contains the following information:-

"On about the 18<sup>th</sup> of February, 1998, I was working at Sedan, where I was using one of the multi tyred rollers. I am not sure of the number of this roller. When I was using it, it kept jumping out of second gear and going back into neutral. The brakes on this vehicle were working fine and they pulled me up okay when the vehicle went into neutral as the vehicle would just roll when it did jump out of gear.

Because the vehicle kept jumping out of gear, and instead of me holding the lever in place, I used some blue strapping to tie the lever in place so that it wouldn't keep jumping out.

I mentioned to Ken Petersen, the supervisor at the job site, about the problem that I was experiencing. I can't remember if he said anything about it, but I just got on with the job that I had to do and kept using the roller". (Exhibit C.12a, p-2).

- 4.18 Mr. Petersen, the supervisor, had no recollection of this fault being reported to him (Exhibit C.13a, p2). Again, it should be noted that it was second gear being complained of, not third.

4.19 The gearbox was examined by Senior Constable S.W. Tully, a qualified mechanic, on 5 May 1998. He found:-

- the third gear cog was blue, caused by running hot due to low gear oil levels;
- the third gear cog teeth were very badly worn;
- the fourth gear cog was rusty and chipped.

4.20 Mr. Tully said:-

“Due to the amount of wear to the dog teeth of the 3<sup>rd</sup> gear, this gear would have ‘jumped out’ on the over run or as the load was taken off. The dog teeth align with the synchro hub and is locked into position by the hub. But, with the amount of wear to the teeth, the hub would not have locked in therefore, causing the gear to jump out. Going by the condition of the gear I would say this has been going on for quite some time”. (Exhibit C.18a, p3).

4.21 Mr. Tully told me that the appearance of the cogs suggested that third gear was the one most often used (T.234).

## 5. **Conclusions**

5.1 The solicitors for Boral Asphalt obtained a report from Mr. Chris Hall, a consulting engineer. His report is Exhibit C.30. Mr. Hall had access to most of the documentary material before me when preparing his report.

5.2 There seems to be conflict on the evidence about the roller jumping out of gear, particularly about which gear was involved. The witnesses refer to either first or second gear, and the slow speed at which the roller was travelling before the accident suggests that it was in a low gear. However, the wear seen by Mr. Tully suggests that third gear was involved.

5.3 Mr. Hall noted that the evidence is not clear about whether the roller jumped out of gear immediately prior to the accident or not (p.2).

5.4 Mr. Hall noted:-

“The reported fault with the engagement dogs on third gear could have caused the roller to jump out of that gear when in an over-run condition. That could occur if the gearbox was being used to slow the roller rather than the brakes”. (p.4).

- 5.5 If, as Mr. Coppins was coming down the hill using the brakes to slow the vehicle, and the brakes failed suddenly throwing all the deceleration effort on to the gearbox, this would also cause it to jump out of gear, on Mr. Hall's analysis.
- 5.6 I have already said that I do not accept Mr. Franze's evidence that the brakes had failed earlier that morning. The nature of the terrain would have made it impossible to operate the machine without brakes. Mr. Coppins' actions in "pumping" the brakes just before the accident, as observed by Mr. Adair, are also inconsistent with him being aware that the brake system had failed earlier in the day.
- 5.7 Mr. Crocker, counsel for Boral, submitted that the evidence disclosed that the roller would have been in first or second gear, and therefore unlikely to jump out of gear since only third gear was damaged. This ignores the fact that Messrs. Watson, Tierney and Baker all noted that the roller jumped out of first or second gear as well. There is no proof that the roller was in any particular gear before the accident. In my opinion, the issue of which gear was engaged is not central to whether the roller jumped out of gear on this occasion or not.
- 5.8 In my opinion, the most probable scenario is that the braking system failed as Mr. Coppins was coming down Alta Crescent, and when all the deceleration effort was transferred to the engine and gearbox, it jumped out of gear. Mr. Coppins understandably lost control of the vehicle from that point on. I do not consider it likely that an experienced and competent operator like Mr. Coppins would have lost control of the vehicle if it was still travelling at slower than walking pace in first or second gear after the brakes failed.

6. **Maintenance issues**

- 6.1 I heard a considerable body of evidence, particularly from Mr. Graham, concerning the standard of maintenance of Boral's equipment both before and since the accident.
- 6.2 It was acknowledged that the system of reporting faulty equipment on a "white board" prior to the accident was inadequate, since no permanent record was kept (T.139). This has been replaced by a written request procedure, with written verification that the defect has been corrected (T.164).

- 6.3 There was a memorandum to “all employees” (Exhibit C.24, annexure D) directing them to report unsafe plant to the foreman, and if he disagreed, to the supervisor. This memorandum was endorsed “Attached to pay envelopes 7/5/96”. There is no evidence that Mr. Coppins received a copy of the notice, nor indeed that any other contracted worker did either. They were not paid by Boral. In my opinion, this is inadequate. Boral should have a system whereby it can verify that all employees, including contracted employees, receive relevant information particularly about safety issues. They should not delegate that responsibility to the contracting company, since they have the primary duty to keep the workplace safe.
- 6.4 I also heard evidence about the “tag-out” system, whereby a tag is put on a machine which automatically takes it out of service until the defect is corrected (see Exhibit C.24, annexure K). There is also a check list to be filled out daily concerning the condition of the machine (Exhibit C.24, annexure S). These are good systems. It is unsatisfactory that Boral were unable to produce the relevant check list book for roller number 231 (T.134).
- 6.5 Without canvassing all of the evidence, I accept that Boral Asphalt have made considerable improvements to their maintenance procedures since the accident. It is to be noted that an ‘Improvement Notice’, pursuant to the Occupational Health, Safety and Welfare Act 1986 (Exhibit C19b), issued by Mr Kiddie, the Workplace Services Inspector, provoked a thorough and detailed response (Exhibit C24, annexure N).
- 6.6 An issue which remains to be attended to is that the system for passing on information to employees remains inadequate. As I have already observed, Boral was unable to verify what information Mr. Coppins would have received during his “induction”, nor could they verify that all safety advices were passed on to contract employees by their employers. I suggested to Mr. Graham that Boral might consider preparing a loose-leaf handbook or manual which could contain all safety-related information (it could also contain other useful information as well). This should be presented at induction, and the employee should sign a receipt. The handbook could then be updated as circumstances require. Mr. Graham agreed that such a manual was worthy of consideration (T.139).

- 6.7 In my opinion, Boral should also take steps to ensure that all repairs are checked, and the machine tested thoroughly before it is returned to service. It is not acceptable that Mr. Keech did not have time to attend to this, if that be the case.
- 6.8 It could be argued that the system put in place by Boral worked appropriately prior to the accident. When the roller's gearbox became faulty, this was reported to Mr. Tierney and was taken out of service immediately for repair. However, it is clear that Mr. Keech's efforts at repairing the gearbox were inadequate. When the fault re-occurred at Sedan two days later, Mr. Petersen did not report it, nor were the tag-out or white board systems employed. As a result, a faulty machine remained in service.
- 6.9 Boral has put extensive systems in place since this accident to ensure that their equipment is properly maintained and faults are rectified immediately. However, these systems will not be effective if employees do not utilise them. This case illustrates that training and education are required to ensure that these systems work appropriately.

## 7. **Recommendations**

7.1 Pursuant to Section 25(2) of the Coroners Act, I recommend:-

- (1) that the Minister of Transport consider the need to compulsorily require that all heavy vehicles, including earth-moving and road-building machinery, be fitted with fail-safe or back-up braking systems;
- (2) that Boral Asphalt consider the need for further training of its employees, particularly supervisory staff, to ensure that they understand the importance of utilising the systems it has set up whenever a fault in machinery is detected;
- (3) that Boral Asphalt consider improvements in its systems for providing safety information to employees, including contract employees;
- (4) that Boral Asphalt take steps to ensure that all repairs to machinery are checked and tested thoroughly before it is returned to active service.

*Key Words: heavy machinery; road building equipment; braking systems; maintenance.*

*In witness whereof the said Coroner has hereunto set and subscribed his hand and*

*Seal the 4th day of August, 2000.*