QUEENSLAND COURTS

OFFICE OF THE STATE CORONER

FINDINGS OF INQUEST

CITATION:	**Inquest into the death of Peter Whitoria MARSHALL**
TITLE OF COURT:	Coroner's Court
JURISDICTION:	Brisbane
FILE NO(s):	COR-442/04(6)
DELIVERED ON:	19 May 2006
DELIVERED AT:	Brisbane
HEARING DATE(s):	20-23 June 2005
FINDINGS OF:	Mr Michael Barnes, State Coroner
CATCHWORDS:	Coroners: inquest, safety procedures for deflation of truck tyres on mine site, supervision of autonomous skilled workers, rim design and tyre handling standards for mine trucks

REPRESENTATION:

Counsel Assisting:	Mr John Tate
Family:	Mr David Kent
Zinifex Pty Ltd & Mr Brett Fletcher:	Mr Peter Roney
Komatsu Pty Ltd:	Mr Damian Cloathier
Roche Eltin Joint Venture:	Mr Peter Hastie

Findings of the inquest into the death of Peter Whitoria Marshall.

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Pursuant to s28 (1) of the *Coroners Act 2003* an inquest was held into the death of Peter Whitoria Marshall. These are my findings. They will be distributed in accordance with requirements of s45(4) and s46(2) of the Act.

Introduction

Shortly before midnight on 9 February 2004, Peter Marshall was removing the outer, right, rear, dual wheel from a giant dump truck at the Zinifex Century open-cut zinc mine in far north western Queensland. Suddenly, without warning, the highly compressed air in the inner wheel was released, throwing the 3.5 ton outer wheel some 13 metres. Mr Marshall had been standing in the path of the wheel's flight and he was driven by it across the tyre bay concrete apron. When the wheel came to rest, Mr Marshall was pinned under it. He died shortly afterwards as a result of injuries sustained in the accident. A co worker also sustained significant injuries.

These findings seek to explain how the accident occurred and recommend changes to industry practice aimed at reducing the likelihood of similar incidents occurring in future.

The Coroner's jurisdiction

Before turning to the evidence, I will say something about the nature of the coronial jurisdiction.

The basis of the jurisdiction

Because the police officer who first became aware of the death considered it to be "*a violent or otherwise unnatural death"* within the terms of s8(3)(b) of the Act, he was obliged by s7(3) to report it to a coroner. Section 11(2) confers jurisdiction on a coroner to investigate such a death and s28 authorises the holding of an inquest into it.

The scope of the Coroner's inquiry and findings

A coroner has jurisdiction to inquire into the cause and the circumstances of a reportable death.

The Act, in s45(2), provides that when investigating a death the coroner must, if possible find:-

- the identity of the deceased,
- how, when and where the death occurred, and
- what caused the death.

After considering all of the evidence presented at the inquest, findings must be given in relation to each of those matters to the extent that they are able to be proved.

An inquest is not a trial between opposing parties but an inquiry into the death. In a leading English case it was described in this way:-

> *It is an inquisitorial process, a process of investigation quite unlike a criminal trial where the prosecutor accuses and the accused defends… The function of an inquest is to seek out and record as many of the facts concerning the death as the public interest requires.* [1]

The focus is on discovering what happened, not on ascribing guilt, attributing blame or apportioning liability. The purpose is to inform the family and the public of how the death occurred with a view to reducing the likelihood of similar deaths. As a result, in so far as it is relevant to this matter, the Act, authorises a coroner to "*comment on anything connected with a death investigated at an inquest that relates to –*

(a) public health or safety ; or

(c) ways to prevent deaths from happening in similar circumstances in the future.[2]

The Act prohibits findings or comments including any statement that a person is guilty of an offence or civilly liable for something.[3]

The admissibility of evidence and the standard of proof

Proceedings in a coroner's court are not as constrained as courts exercising criminal or civil jurisdiction because s37 of the Act provides that "*The Coroners Court is not bound by the rules of evidence, but may inform itself in any way it considers appropriate."*

This flexibility has been explained as a consequence of an inquest being a fact-finding exercise rather than a means of apportioning guilt: an inquiry rather than a trial.[4]

A coroner should apply the civil standard of proof, namely the balance of probabilities, but the approach referred to as the *Briginshaw* sliding scale is applicable.[5] 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 trier of fact to be sufficiently satisfied that it has been proven to the civil standard.[6]

It is also clear that a coroner is obliged to comply with the rules of natural justice and to act judicially.[7]This means that no findings adverse to the interest of any party may be made without that party first being given a right to be heard in opposition to that finding. As *Annetts v McCann*[8] makes clear,

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[1] *R v South London Coroner; ex parte Thompson* (1982) 126 S.J. 625
[2] s46(1)
[3] s45(5) and s46(3)
[4] *R v South London Coroner; ex parte Thompson* per Lord Lane CJ, (1982) 126 S.J. 625
[5] *Anderson v Blashki* [1993] 2 VR 89 at 96 per Gobbo J
[6] Briginshaw v Briginshaw (1938) 60 CLR 336 at 361 per Sir Owen Dixon J
[7] *Harmsworth v State Coroner* [1989] VR 989 at 994 and see a useful discussion of the issue in Freckelton I., "Inquest Law" in *The inquest handbook*, Selby H., Federation Press, 1998 at 13
[8] (1990) 65 ALJR 167 at 168

that includes being given an opportunity to make submissions against findings that might be damaging to the reputation of any individual or organisation.

The investigation

I turn now to a description of the investigation into this death.

Mr Marshall died in the emergency treatment room at the mine while under the care of a nursing sister pending the arrival of the Royal Flying Doctor Service. His body was flown back to Mt Isa by the RFDS and then to Brisbane where an autopsy was performed by a forensic pathologist on 13 February.

The Inspector of Mines was notified of the accident within an hour of it occurring. He directed that the site be secured. The next day police and the District Inspector of Mines, Mr Peter Power and other officers from the Department of Natural Resources Mines and Energy (as it then was) attended the scene and commenced an investigation.

The scene was photographed and all relevant equipment seized and or inspected. All mine workers and executives with information relevant to an understanding of the accident were either interviewed or provided statements. Company policy documents and procedures were copied. Subsequently, expert assistance was provided by SIMTARS (Safety in Mines Testing and Research Station), an expert mine safety analysis unit.

Mr Power and those assisting him produced a detailed report and an animated graphic both of which I found very helpful in understanding the sequence of events leading to Mr Marshall's death. All of those granted leave to appear accepted, with some minor variation, that the animation accurately depicted the chain of events leading to the fatality.

I am satisfied that the investigation was thorough and professional and that it addressed all of the relevant issues.

The inquest

Preliminary hearings and a view

The matter was initially reported to the coroner at Mt Isa but it became apparent that the inquest into this matter would be protracted. Lengthy matters impose significant burdens on single magistrate courts and as it appeared likely that the convenience of the parties would best be served by the inquest being heard in Brisbane, I agreed to a request from the Mt Isa Coroner that I assume responsibly for the matter.

A directions hearing was held in Brisbane on 18 March 2005. Mr Tate of Crown Law was appointed counsel assisting and leave to appear was granted to the family of Mr Marshall; Zinifex Century Ltd, the leaseholder; Komatsu Ltd, the manufacturer of the truck involved in the accident; and Roche Elton Joint Venture Ltd, Mr Marshall's employer.

A view of the scene and a demonstration of tyre fitting procedures was undertaken on 18 May. This was of great assistance to the Court and I acknowledge with gratitude that effort and expense devoted to this by the mine operator's senior staff and the officers of the District Inspector of Mines.
The hearing proceeded over four days from 20 June 2005. 16 witnesses gave evidence and 78 exhibits were tendered. The inquest was then adjourned to enable further inquiries to be undertaken and for the parties to make written submissions. Those matters were attended to by March 2006. I found the submissions of the parties most helpful and thank their lawyers for them.

The evidence

I turn now to the evidence. I can not, of course, even summarise all of the information contained in the exhibits and transcript but I consider it appropriate to record in these reasons the evidence I believe is necessary to understand the findings I have made.

Truck 733 is a Komatsu 630E haul truck with a load capacity of 190 tons. It is one of many such trucks used at the Zinifex Century zinc mine to move overburden and ore.

On 9 February 2004, this truck was in the tyre bay during the day having one of its two right rear wheels changed.

When truck driver Richard Wyatt commenced his shift at 5.30pm he was allocated this vehicle and told to collect it from the tyre bay. As he was leaving the bay, Peter Marshall, a senior tyre fitter and only man working in the tyre bay that night, told him to bring the truck back after it had dumped its first load so that the nuts holding the wheel that had been changed could be re-tensioned.

This was done without incident. Mr Wyatt then drove back to the pit to continue carrying overburden out of the pit. After he had been working for a short while he noticed that the cover on the back left side wheel that keeps dust and other foreign material out of the electric motors that are in the hub of each of the back wheels had come loose. He radioed for assistance and a maintenance worker came to him and repositioned the cover. Neither Mr Wyatt nor the maintenance worker noticed any other problem with the wheel, but shortly after the cover had been replaced, when Mr Wyatt was transporting the next load he heard the sound of escaping air and realised that one of the truck's tyres was leaking.

He again radioed for assistance and Mr Marshall and a supervisor, Mr Chong, came and inspected the truck. It was apparent to them that the valve stem of outer left rear tyre was the source of the leak and so Mr Wyatt was directed to dump his load and to again drive the truck to the tyre bay. He arrived there at about 10.00pm.

After a break Mr Wyatt collected the truck and Mr Marshall told him that he had replaced the valve stem on the outer left rear wheel. Depending on which reference document is consulted, if that wheel had deflated to below either 50

or 60% of its normal operating pressure, the wheel should have been removed from the truck and the tyre re-fitted to ensure the components which are to some extent held in place by the pressurised tyre, had not been displaced. It is not known what pressure was left in the tyre when Mr Marshall worked on it but it is clear that he did not replace the tyre but rather replaced the valve stem and re-inflated it. Also, as the job was completed in less than 20 minutes it is unlikely that Mr Marshall deflated and reinflated the adjacent inner rear left tyre as he should have.

There was a delay due to problems with some other equipment and Mr Wyatt then again commenced to carry mined material.

He'd only carried one load when he heard a loud bang from the back of his truck which he realised was a tyre blow out. Unlike the previous incident this was not a slow leak; rather the outer left rear tyre was completely flat when he inspected it soon after hearing the noise.

Mr Wyatt therefore drove the truck back to the tyre bay and told Mr Marshall what had happened. Mr Marshall moved the truck into the position he wanted it in to work on and then inspected the wheel which needed repairing.

He saw and showed Mr Wyatt that the lock ring that sits in a groove in the rim and holds that other parts of the rim in place, had been displaced from the inner side of the outer left rear wheel and was hanging loose on the spacer that separates the dual wheels.

Mr Marshall then began working on the truck. He moved a hydraulic jack under the back axel and raised it. He then removed all of the wheel nuts using a compressed air powered spanner. To complete the removal of the wheel, Mr Marshall then had to remove 12 cleats. These are tapered steel wedges jammed between the rim and wheel hub and held in place by the wheel nuts and friction. They are freed by screwing a jacking bolt through a hole in their centre which makes increasing contact with the hub as it is advanced, pushing the cleat clear of the rim.

As Mr Marshall commenced removing the first cleat, there was an explosion and the wheel he was working on was propelled, perpendicularly, away from the truck at great speed. Mr Marshall was within arms length of it and in its direct line of travel and so was driven by it across the tyre bay apron. The wheel landed approximately 13 metres from the truck.

Mr Wyatt was also impacted by the explosion. He was knocked to the ground and suffered severe facial injuries. However, he did not lose consciousness and, after picking himself up, he immediately looked for Mr Marshall. He saw that Mr Marshall was under the wheel. Some of the weight of the wheel was supported by a trolley that Mr Marshall had been using and which must also have been swept away by the explosion. However Mr Marshall's left leg and left wrist were pinned against the ground by the wheel. He was face down, with his head, torso and other limbs confined in the space within the centre of the rim.

Workers in the nearby heavy vehicle workshop heard the explosion and saw debris flying and a black cloud of dust rising from the vicinity of the truck. They ran to the scene. Mr Marshall was conscious but obvioulsy severely injured. First aid was administered and the Emergency Response Team (ERT) was activated. A nursing sister was quickly on site and efforts soon commenced to free Mr Marshall. This was made more difficult by the rim and the tyre not being bound together but at the same time not initially being able to be moved independently of each other. As the tyre was lifted it had to be supported to ensure that it did not collapse back onto Mr Marshall and the same with the rim.

The Royal Flying Doctor Service was called as soon as the nursing sister was advised of the accident but the people on hand knew that Mr Marshall's survival depended on their being able to free him as quickly as possible so that more constructive medical aide could be administered.

Mr Marshall was freed and taken by company ambulance to the medical centre. Sadly, by this time, he had no pulse or detectable heart rhythm. In my view he was, at this stage, already dead. None the less, acting on instructions from the RFDS relayed by telephone, the nurse and those assisting her unsuccessfully attempted cardio pulmonary resuscitation.

Having regard to the detailed evidence describing their efforts, I am persuaded that those involved in responding to the incident did all that could reasonably be expected of them. The ERT had not trained for this particular event but obviously, on such a site, the possible accident scenarios are numerous. This was a difficult extraction with potential further danger to Mr Marshall and those rendering first aid. I accept they performed as well as could be expected even though it took about an hour to free the injured man.

The RFDS arrived at about 2.00am and confirmed that Peter Marshall was dead. They took his body back to Mt Isa when they evacuated the injured Mr Wyatt and the investigation detailed above commenced.

An autopsy was performed three days later in Brisbane. It found Mr Marshall had suffered numerous fractures and internal injuries. Of significance was a severe displaced neck fracture. The forensic pathologist was unable to express an opinion as to the precise fatal injury or mechanism of death which caused Peter Marshall's demise suggesting that it was most likely the result of a combination of the various traumas and bodily reactions caused by the impact of the tyre and the resultant crushing injuries. Mercifully, the spinal injury would have prevented Mr Marshall experiencing any great pain during his ordeal.

Findings required by s45(2)

I am required to find, as far as is possible, the medical cause of death, who the deceased person was and when, where and how he came by his death. I have already dealt with this last aspect of the matter, the manner and circumstances of the death. As a result of considering all of the material contained in the

exhibits and the evidence given by the witnesses, I am able to make the following findings in relation to the other aspects.

Identity of the deceased – The deceased was Peter Whitoria Marshall

Place of death – Mr Marshall died at the Zinifex Century Zinc mine near Lawn Hill in far north western Queensland.

Date of death – He died in the early hours of 10 February 2004

Cause of death – Mr Marshall died as a result of crush injuries sustained when he was struck by and pinned under a heavy wheel as a result of an industrial accident.

Comments and preventive recommendations

Section 46, in so far as it is relevant to this matter, provides that a coroner may comment on anything connected with a death that relates to public health or safety or ways to prevent deaths from happening in similar circumstances in the future.

The narrative articulated earlier briefly describes what happened sequentially but it doesn't explain why it happened. An understanding of the underlying causes, and, if relevant, the organisational characteristics of the context in which they occurred and/or or the systems failures which contributed to them is necessary for the development of prevention strategies. It has also been suggested that the design and condition of some of the wheel components may have contributed to the event. Consideration of those aspects of the matter is therefore appropriate.

A starting point is the first deflation of the outer left rear tyre, early in Mr Wyatt's shift, although, as will become apparent, some of the systems issues and underlying causes may predate this incident by some weeks or months.

Did the design of the wheel motor cover contribute to the accident?

On the basis that this has occurred previously, it is postulated that the loose wheel motor cover may have damaged the valve stem leading to the first deflation. However, on this occasion, when the maintenance man replaced the motor cover, he and the driver were of necessity working close by the valve stem and it seems unlikely that they would not have noticed if it was damaged. While it is possible that the stem was then already broken but not displaced, if this were the case, it seems unlikely that it would so soon after leak so significantly. Another explanation is that when being loaded after the motor cover was reinstated, a piece of rock fell against the valve stem and caused the damage that Mr Wyatt heard from the cabin. In view of the uncertainty around this aspect of the matter I consider I have insufficient basis

for accepting the submission that I recommend changes to the fastenings of the wheel motor covers.

The cause of the deflation of the outer tyre

There is some evidence concerning the cause of the second deflation – the blow out of the outer tyre. Computerised dispatch records show that after the first deflation, truck T733 arrived at the tyre bay at 2158 and was "*on standby to release to operations*" at 2217. The short duration of the maintenance period suggests that Mr Marshall did not deflate the inner rear left tyre. Other records indicate the outer tyre was not replaced but rather Mr Marshall replaced the valve stem and reinflated that tyre.

Both of these practices are problematic. When removing either tyre from a vehicle with dual tyres, both should be deflated to ensure that work on one does not cause an uncontrolled release of pressure from the other. Further, as mentioned earlier, when a tyre has been operated at low pressure, it should not be simply reinflated after the cause of the leak has been addressed because there is a danger that the rim components may have been displaced when the vehicle was operating with excessively low pressure in the tyre in question. Rather, the tyre and rim should be removed from the vehicle and the tyre refitted to the rim after the components have been cleaned and checked.

The evidence does not enable me to determine with precision the extent of the first deflation of the outer, left, rear tyre on the night in question. It was detected leaking soon after the truck was loaded at 2128 and was at the tyre bay at 2158 so there is a basis to suspect that much of the air may have bled from the tyre during the 30 minutes (at least) that it was leaking and while the broken valve stem was removed and a new one inserted. This also provides a basis for suspecting that indeed the rim components on the outer tyre did become displaced which would explain why the next time the truck was loaded with, as the records indicate, 138 tonnes of material, that tyre blew out.

Did damaged rim components contribute to the blow out of the inner tyre – the fatal event?

It seems likely that when the outer tyre blew out, the locking ring on its inner side was propelled with great force into the adjacent inner rim, impacting on its lock ring partially displacing it. The examination conducted by SIMTARS showed that the lock ring on the outer face of the inner left rear rim was deformed by a high energy impact at one end and deformed over 230mm at the other end and that a small section of this end was broken off. This led to theorising that the impact to this rim caused all but this last section of lock ring on the inner rim to be "*unwound"* from its groove so that when Mr Marshall began working on the outer rim, the components of the inner rim were only held in place by the short piece of lock ring that remained in its groove. When some of the pressure on the inner rim was released by the removal of the wheel nuts from the outer rim, the lock ring on the inner rim finally came fully loose when the rattle gun was used to jack out the first cleat. With devastating effect, the inner rim components then blew apart, releasing the 100 psi

pressure contained in the inner tyre, sending the outer tyre and rim components flying across the concrete apron, violently impacting all in its path, including Mr Marshall.

This theory raises the question of whether the condition of any of the components contributed to the uncontrolled release of pressure from the inner tyre. In particular, the issue of the components is raised as a result of the SIMTARS findings that there was "*unusual wear on the full circumference of the outer edge of the lock ring grooves suggesting the lock rings had not been fully seated for some time."* The SIMTARS' report also mentions traces of mud in the rim gutters of both rim bases. Mr Davis, an engineer from SIMTARS, said in evidence that when examining the inner rim in particular, he was able to detect layers of mud, the deepest of which he concluded had been compressed by having the locking ring placed over it .This led him to conclude that the rims had not been properly cleaned before assembly which made it likely that the lock rings had not been correctly seated, leading to wear and deformation of the lock ring grooves which "*would allow the lock rings to come out of their grooves more easily."*

Understandably, these conclusions were strenuously tested by some of the parties during cross examination. Mr Davis conceded that he was basing his opinions on speculation to some extent and that he was attracted to them because they enabled him to explain how the accident may have occurred. I am prepared to accept that a man of Mr Davis' experience is able to distinguish between mud that has recently been applied to the parts in question and that which has been present and compressed for some time. I also accept his ability to distinguish between old corrosion and that which occurred as a result of damage done to the parts during the explosion. Further there is evidence that the system of rim maintenance in place at the material time did not allow the operators to have confidence that all rim components complied with manufactured specifications and that wear was within acceptable tolerances. However, there is in my view, insufficient evidence to show that the build up of mud in the groove was sufficient to compromise the integrity of the lock ring. I therefore decline to find that the condition of the components contributed to the accident. I am also satisfied that changes to rim maintenance procedures have removed the likelihood of poor maintenance contributing to future accidents.

Did lack of training or inadequate safety procedures contribute to the accident?

Another issue I wish to address is whether the training of the tyre fitters or the safety procedures in place in the tyre bay contributed to the accident.

The description of the events that I have read earlier suggest Mr Marshall apparently failed to adhere to safe practice on at least the last two occasions that he worked on the truck on the night in question. Of course, no one likes to be critical of the dead, particularly when their death has occurred in such violent, yet innocuous circumstances, namely a hardworking man simply doing his job. It has become obvious to me during the time that I have been

working on this investigation that Mr Marshall was a much loved husband and father and his family have my sincere condolences. I trust they accept that only by carefully examining Peter's conduct on the night of his death will we be able to properly understand how the likelihood of similar deaths occurring in the future may be reduced.

The departures from proper procedure when the truck was brought back for repair of the valve stem have been detailed already. When it was returned after the same wheel blew out, Mr Marshall did not chock the front wheels; he did not put a stand under the axel after he jacked the truck; he did not deflate the inner left rear tyre; he removed all 24 wheel nuts before removing the cleats and he did not take hold of the outer wheel with the tyre handling machine before removing the wheel nuts. All of these actions increased the risk of harm to Mr Marshall and were contrary to documented procedures.

I do not believe that the dangerous acts were a result of a lack of knowledge; Mr Marshall was well trained and very experienced. His employer had in place a comprehensive system of documented job practices – job safety analyses or JSAs - that Mr Marshall had helped develop. There were a number of errors in some of these documents but having regard to all of the evidence I find that in all probability Mr Marshall knew that the various deviations or departures from proper procedure that I identified earlier were just that.

Nor is there evidence that he was, on the night in question, overly tired or rushing to keep up with too great a work load. He knew what to do and he had the time and capacity to do it relatively safely.

If it were possible to categorise Mr Marshall's actions on the night in question as an isolated lapse of compliance with safe procedures nothing more might need to be done. However, there is a significant body of evidence indicating that this is not the case. For example, during the inquest one of the other tyre fitters gave evidence that on two earlier occasions he had witnessed Mr Marshall fail to deflate both tyres before removing one of them. Further, after the hearing, two other tyre fitters were re-interviewed and each said that they were aware that the requirement to deflate tyres before removing them was routinely ignored. Indeed two of the four tyre fitters who worked at the mine at the time of the accident told the investigator that none of the fitters routinely deflated the tyres. It was submitted that no credence should be given to these statements as they contradicted the earlier versions provided to the Mines Inspector and were untested. I don't accept that submission. I can more readily understand why on the first occasion those witnesses might be unwilling to be frank but that after they learned that one of their cohort had changed his version without adverse consequences they might be more inclined to tell the truth. Accordingly I find that there were repeated departures from safety procedures over a significant period of time by most, if not all, of the tyre fitters. None of the various audits, JSOs or routine supervision detected these numerus incidents of non-compliance.

Even more surprising, in August 2005, just 18 months after the death of Mr Marshall, the Mines Inspector who investigated this matter made an

unannounced visit to the tyre bay and found four workers in the process of removing a front wheel of a truck without first having deflated the tyre to the safe level. Again it was submitted that I should have no regard to that incident because it occurred 18 months after Mr Marshall's death and involved different individuals and the circumstances of the later incident have not been tested by oral evidence or cross examination. It was submitted that this incident should also be seen as an isolated incident from which I could not draw any general conclusions.

I readily accept that were I contemplating imposing some sanction on any of those directly or indirectly involved in the August 2005 incident I would certainly need to know much more about it and allow those concerned to better inform me in that regard. However, I do not consider that I am bound to do so if I intend only to rely on the information concerning that incident for the purpose of framing preventative recommendations.

As a result of hearing evidence from the Senior Site Executive and the Maintenance Engineer, I am persuaded that there was in place at the mine at the relevant time a sophisticated and comprehensive safety system comprised of external and internal audits, continuously updated job safety analyses (JSAs), safety committees, tool box meetings, mines inspectorate audits, safety alerts, weekly hazard inspections and hazard reviews, work area standards and job safety observation reports (JSOs). There was even a poster with a rather gruesome cartoon of a worker having his head ripped off by an exploding rim and indeed in 2002 the mine had won an award that in part related to safety systems.

The evidence of those senior people and of others workers who gave evidence also persuaded me that the leaseholder, the SSE and the major contractor, REJV, took very seriously their obligation to maintain safe systems of work. Certainly, these systems were not merely "window dressing" and, while no direct evidence was given on the point, it is obvious that the companies involved have devoted very significant financial resources to safety issues. Further, since the death of Mr Marshall, relevant SOPs have been developed and a system of tagging deflated tyres has been introduced.

Notwithstanding these endeavours, there is compelling evidence that they have not resulted in a sufficiently high level of compliance with safety standards in the tyre bay. I accept that this non-compliance was news to the company executives and supervisors which means that there is no reason to think that the gap between organisational artefacts – the policies and procedures – and what the workers actually do, doesn't exist also in other parts of the operation.

The idea that inherently dangerous activities can be made safe by a multiplicity of rules is of course flawed. Compliance with the rules and commitment to safe practice is also required. Organisational and industrial psychologists have for some time articulated the difficulties of changing the climate and culture of an organisation and have recognised the limited role rules can play in such a process.

With all due respect to the current senior executives of Zinifex Century Mine and the REJV, they seem to have assumed that by implementing a more complex interlocking system of audits, reports and rules they would generate a more safety sensitive culture. However, their reluctance to acknowledge concepts such as risk normalising and risk acceptance seem to indicate that there may be a need for some rethinking about how the inherently dangerous activities undertaken at the mine should be managed.

Safety professionals talk about “hard” and “soft” barriers to prevent risks actualising. An example of a hard barrier in this setting would be a redesign of the wheel which prevented it from being removed unless the tyre was sufficiently deflated. An example of a soft barrier is training in the risk of removing inflated tyres. The design and implementation of hard barriers differs significantly from the way soft barriers are developed. I was left with the impression that the executives of the leaseholder and major contractor approached safety primarily from an engineering perspective better suited to hard barriers.

It seem to me that while workers continue to engage in aberrant behaviour when that activity has recently led to the death of one of their colleagues, the organisation can not claim to have instilled a “safety first” approach among the workforce. Indeed, such actions would seem to suggest that the organization is in urgent need of some specialist outside advice as to how the culture and climate could be changed to lessen the gap between its artefacts and the action of its workers.

Recommendation 1 - An analysis of the safety culture at the mine

I recommend that Zinifex Century and REJV engage a competent consultant with an industrial or organisational psychology background to review the safety culture of the operation with a view to better informing management of how safe work practices can be internalised by staff of the mine.

Supervision

The ongoing nature of the non compliance that I have found occurred in the tyre bay also raises questions about the effectiveness of the supervision of those working there. I readily accept that constant line of sight supervision was and is not practical in such a situation. However, in my view, it is self evident that the supervision of the tyre fitters at the material time was lacking in that apparently no one outside the tyre bay knew the tyre fitters were not complying with the relevant JSA. I understand the system of supervision at the mine has been reviewed but I consider a more holistic examination of the issue is warranted.

This issue is of industry wide significance and my recommendation in relation to it will be framed accordingly.

Recommendation 2 - Supervision of autonomous skilled workers

I recommend that the Mines Inspectorate investigate how meaningful supervision can be delivered to a heterogeneous workforce of skilled autonomous workers engaged on a disparate site and that they publish their findings and practical examples applicable to various mining activities

Rim design and tyre handling standards

In my view it is also important that the valuable work done to date aimed at ameliorating the particular dangers posed by high pressure tyres and multi component rims continue. This work needs the involvement of industry participants - both operators and manufacturers. I would also have thought that SIMTARS and the Mines Inspectorate could make a valuable contribution.

Recommendation 3 – Continued development of AS 4457

I recommend that the Mines Inspectorate, SIMTARS and industry participants continue with the revision of AS 4457 and that special attention be given to tyre handling, lock ring retenion and rim maintenance.

This inquest is now closed.

Michael Barnes
State Coroner
19 May 2006