QUEENSLAND COURTS

OFFICE OF THE STATE CORONER

FINDINGS OF INQUEST

CITATION:	**Inquest into the death of Daniel Paul Morris**
TITLE OF COURT:	Coroners Court
JURISDICTION:	Townsville
FILE NO(s):	2011/999
DELIVERED ON:	15 August 2013
DELIVERED AT:	Townsville
HEARING DATE(s):	13 - 15 August 2013
FINDINGS OF:	Jane Bentley, Coroner
CATCHWORDS:	Coroners: inquest, electrocution, welding, Australian Standards, AS1674.2, Code of Practice, hazard-reducing devices, voltage reduction devices

REPRESENTATION:

Counsel Assisting:	Ms Stephanie Williams
Mr and Mrs Morris:	self-represented
Skilled Group Ltd:	Mr John Miles of Counsel, i/b CIE Legal
Ridley Agriproducts Pty Ltd:	Mr Harvey Walters of Counsel, i/b by DLA Piper Solicitors
Workplace Health and Safety Qld:	Mr Peter Major

1. Section 45 of the *Coroners Act 2003* provides that when an inquest is held the coroner's written findings must be given to the family of the person who died, each of the persons or organisations granted leave to appear at the inquest and to officials with responsibility over any areas the subject of recommendations. These are my findings in relation to the death of Daniel Paul Morris. They will be distributed in accordance with the requirements of the Act and posted on the web site of the Office of the State Coroner.

Introduction

The scope of the Coroner's inquiry and findings

2. An inquest is not a trial between opposing parties but an inquiry into a death. The scope of an inquest goes beyond merely establishing the medical cause of death.

3. 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 and, in appropriate cases, with a view to reducing the likelihood of similar deaths.

4. As a result, a coroner can make preventive recommendations concerning public health or safety, the administration of justice or ways to prevent deaths from happening in similar circumstances in future.

5. A coroner must not include in the findings or any comments or recommendations, statements that a person is or maybe guilty of an offence or is or maybe civilly liable.

6. Proceedings in a coroner's court are not bound by the rules of evidence. That does not mean that any and every piece of information however unreliable will be admitted into evidence and acted upon. However, it does give a coroner greater scope to receive information that may not be admissible in other proceedings and to have regard to its origin or source when determining what weight should be given to the information.

7. A coroner should apply the civil standard of proof, namely the balance of probabilities. However the more significant the issue to be determined, the more serious an allegation or the more inherently unlikely an occurrence, then the clearer and more persuasive the evidence needs to be for a coroner to be sufficiently satisfied it has been proven.

8. If, from information obtained at an inquest or during the investigation, a coroner reasonably suspects a person has committed an offence, the coroner must give the information to the Director of Public Prosecutions in the case of an indictable offence and, in the case of any other offence, the relevant department. A coroner may also refer a matter to the Criminal Misconduct Commission or a relevant disciplinary body.

9. These findings:

    - confirm the identity of the deceased person, the time, place and medical cause of his death;

- consider whether the actions or omissions of any third party, in relation to workplace safety, contributed to his death; and

- consider whether any changes to procedures or policies could reduce the likelihood of deaths occurring in similar circumstances or otherwise contribute to public health and safety or the administration of justice.

Summary

10. At the time of his death, Daniel Paul Morris (Mr Morris) was 23 years old and lived at 467 Forestry Road, Bluewater Park.

11. Mr Morris was employed by Skilled Group Ltd (Skilled), (a labour hire business) and was working at the premises of Ridley Agriproducts Pty Ltd (Ridley) at 34-38 Webb Drive, Bohle as a Production Supervisor.

12. Ridley produced wet and dry animal feed and cattle lick blocks. In March 2011 Ridley was not in production mode. Maintenance was being carried out on the plant.

13. On 16 March 2011 there were four employees present at Ridley – Michelle Maguire, Site Manager, Wayne Andrews, Storeman, Justine Lee Standen, Labourer and Mr Morris.

14. At about 2.15pm Mr Morris was working with Mr Standen. Mr Morris was performing the task of welding mesh onto a metal block plant hopper. Mr Standen was grinding the welds after Mr Morris had finished them.

15. Mr Morris was using a Liquidarc 245 welder which was attached to a three phase lead which was plugged into a switchboard.

16. Mr Morris was sitting on the metal hopper with his legs dangling down whilst he was welding. Mr Standen passed Mr Morris a new welding rod and then looked away for a moment. When he looked back he saw that Mr Morris was shaking. Mr Morris was holding his hands down near his stomach and he still had the welding handle in his left hand.

17. Mr Standen ran to turn the three phase off, ran to the office to raise the alarm and then ran back to Mr Morris. Mr Morris was no longer shaking but was foaming from the mouth and unconscious. Once Mr Standen confirmed that it was safe to touch and move Mr Morris he commenced CPR.

18. Queensland Ambulance Service attended and officers continued CPR. Mr Morris was transported to the Townsville Hospital where he was admitted to the intensive care unit and placed in a medically induced coma.

19. It became evident that Mr Morris would not survive. He was treated palliatively until he died at 6.45am on 23 March 2011.

The investigation

20. The Department of Workplace Health and Safety (WH&S) carried out an investigation into the death of Mr Morris.

Autopsy

21. Professor David Williams, Consultant Forensic Pathologist, conducted an autopsy on 25 March 2011 and concluded that Mr Morris died from electrocution.

22. Professor Williams noted that Mr Morris had a brown mark at the base of the third finger of his left hand and an area of discoloration at the radial aspect of the second finger of the right hand.

The Equipment

23. The equipment in the vicinity of Mr Morris at the time of his death, including the welder, was seized by inspectors from the Electrical Safety Office (ESO) and tested in their laboratory in Brisbane.

24. The inspectors found no faults with the equipment and it was deemed not to be unsafe.

25. The welder, as tested, was operational and no fault was identified that would classify the welder as not being electrically safe. The output cables attached to the welder were damaged and, as tested, their insulating properties were compromised by that damage but it was concluded that the damage would not have contributed to the accident.

26. Given that no defects were identified with the equipment and that the incident was not witnessed by anyone, the WH&S investigators and the investigators from the ESO concluded that the inference to be drawn from the circumstances was that Mr Morris received the fatal shock from contact with the electrode in the hand piece.

27. Tests on the welder, carried out by the ESO, revealed:

- the welder was a “Liquidarc 245”
- the welder was supplied by two phases at 415V;
- the output voltage of the welder measured 62V;
- when a resistance of 2000 ohms (to simulate the resistance of a human body from hand to foot) was connected across the output terminals of the welder, the recorded current was 32.0mA.

28. The relevant standards for testing provide that, if a human body completed that current path for two seconds, the body could experience strong involuntary muscular contractions, difficulty in breathing, reversible disturbances of heart function and, immobilization may occur.

29. Less resistance could be expected for a shorter body path – if the resistance decreases, the touch current would be expected to increase and also the deleterious physical effects.

30. The ESO convened an Electrical Fatality Review Committee to assess the adequacy of electrical safety issues involving the death of Mr Morris. The Committee reviewed the circumstances of the death of Mr Morris and prepared a report. The Committee noted that Mr Morris was very sweaty at the time of the incident due to the humid conditions and that:

A build up of sweat or moisture on skin can increase the likelihood of conductivity between live parts and the earth via the human body, even when protective clothing is being worn. This is due to the fact that moisture can increase the conductivity of clothing material, and gaps between material and items such as gloves and boots may expose moist skin to metal surfaces in these circumstances.

In recognition of this, Australian Standard AS 1674.2 refers to the use of a Hazard Reduction Device (HRD) in the context of operating electric welders. These are not mandatory requirements but are suggested as a way of managing the risk of open circuit voltage from welders.

Heat and humidity in tropical areas during summer affect what "category" the welding works falls into. Under AS1674.2 the work might, during summer days, fall into category B & C which then means the welder open circuit voltage is required to be lower.

While this standard is not directly referenced under the Electrical Safety Act 2002, following the standard would be way to discharge a person's obligation to manage the electrical risk from welding to as low as reasonably achievable.

31. The Committee recommended that the ESO:

    a) Write to Standards Australia to recommend mandatory Hazard Reduction Devices (HRD) under Australian Standard 1674.2 in humid conditions, such as in Queensland;

    b) Make a submission to Safework Australia that the Code of Practice for Welding and Allied Processes reference AS1674.2 (Safety in welding and allied processes Part 2 Electrical) and also specifically define the three classes of welding environments including humid conditions and mandate the associated risk treatment measures (such as HRD) when welding with a manual metal-arc welder;

    c) Seek out opportunities to distribute an updated WHSQ fact sheet on cutting and welding including references to HRD to welders and welding businesses (such as metal shops) in manufacturing hubs across Queensland; and,

    d) Include these requirements for welding operators into a future audit campaign for Electrical Safety inspectors.

32. In relation to the above recommendations WH&S advised that:

- The ESO has undertaken a review of the Australian Standard 1674.2 in relation to welding in humid conditions. This standard mandates maximum open circuit voltages that must not be exceeded. These voltages are classified as extra low voltage in electrical safety standards. A voltage reduction device would only be required where the open circuit voltage exceeds these values.

- A review of the Safe Work Australia Code of Practice - Welding Processes 2012 was conducted. This Code of Practice identifies control measures for working in humid conditions including the use of hazard reduction devices. It also refers to AS 1674.2 for further guidance on electrical safety.

- The WHSQ web site has available fact sheets relating to electrical safety when cutting or welding processes are being undertaken. These fact sheets have been developed for a number of industries including rural and manufacturing.

- The Electrical Safety Compliance section has developed an auditing project relating to electrical safety for welding operators. This project will be completed in the 2012-2013 year.

The Workplace

33. Skilled was the employer of Mr Morris and it provided workers to Ridley. Mr Morris was employed by Ridley under a labour hire contract, as a Production Supervisor.

34. Skilled provided an employee induction to Mr Morris in June 2008 and a revision in May 2010.

35. Mr Morris was the workplace contact at Ridley during a workplace risk assessment program. Mr Morris did not have the necessary training to undertake "Hot Work" which would include welding.

36. Ms Maguire advised that it was not envisaged that Mr Morris would perform welding work as this was contracted out by Ridley to a company and also that she had no knowledge that Mr Morris was or would be welding. As such, it was determined that no "Hot Work" permit would have been required to have been held by Mr Morris.

The Conclusion

37. Investigators decided not to prosecute Skilled or Ridley based on the following findings:

- all the equipment used by Mr Morris was in a serviceable working condition;

- although the work being performed by Mr Morris at the time of his death was not part of the assigned scope of work for which he was hired, neither Skilled nor Ridley had a reasonable opportunity to identify that he was carrying out that work and prevent him from so doing;

- Mr Morris was employed in a supervisory role and was in some part responsible for the work which was to be performed.

38. An improvement notice was issued to Ridley to ensure that only suitably trained persons undertake welding in the future and it was recommended that a comprehensive audit be conducted on that company to ensure that it has a suitable system in place to monitor the work being performed by their workers.

39. On 17 November 2011 Ridley advised the WH&S investigators that it had complied with the notice in that:

40. All welders had been removed from the site;

41. Any welding activity to be undertaken would be outsourced to qualified independent contractors;

42. A “Hot Work, Welding and Cutting Safety Procedure” and a “Welder Procedure Assessment Form” had been developed to be used as part of an induction for any contractor who attended the site for welding activity;

43. Site employees had been re-trained in relation to the expectation that welding would be undertaken by contractors.

44. The “Hot Work, Welding and Cutting Safety Procedure” includes requirements that:

45. welders be fitted with voltage reduction devices (although in Category C environments only);

46. welding gloves be worn whilst changing electrodes and that they be dry;

47. leather cushions, wooden duckboards or other means be used to insulate the Welding Operators from damp concrete flors and any exposed parts of the work piece.

The inquest

48. A pre-inquest conference was held on 10 July 2013 and the inquest listed to commence on 13 August 2013. The parties were given leave to appear and all agreed that the issue to be explored at inquest was the circumstances surrounding the death of Mr Morris.

49. The mother and father of Mr Morris, Pamela and Paul Morris, stated that they wished to give evidence at the inquest and each undertook to provide a statement which could be distributed to the parties. They did so and the statements were provided.

50. Material gathered during the coronial investigation was tendered as evidence at the commencement of the inquest.

51. The following witnesses were called:

- Paul Morris
- Justin Standen
- Wayne Andrews
- Michelle Maguire
- Clint Hodges
- Jeffrey Drayton

The Evidence

Paul Morris

52. Mr Paul Morris gave evidence that he worked at Ridley from August to October in 2010. He was an employee of Skilled and contracted to Ridley as a labourer. He worked in the production shed and was employed during the production season. During that period he was allocated tasks by Mr Morris.

53. Paul Morris said that he saw welding done at Ridley by Ridley employees but not Mr Morris. He said that welding was carried out on one occasion that he saw in relation to plant maintenance. He believes that Mr Morris would have been the person who directed the employee to carry out the welding as Mr Morris was the Production Supervisor at that time. Mr Morris also showed Paul Morris where welding had been carried out on an elevator and he believed that it had also been undertaken by Ridley workers.

Justin Standen

54. Mr Standen gave evidence that he had been working at Ridley for about three weeks at the time of Mr Morris' death. His duties included general cleaning and other tasks to get the plant ready for the production season. He was not provided a list of jobs but performed tasks as allocated by Mr Morris.

55. Mr Standen said that Mr Morris was his supervisor and that they were not supervised by anyone else at Ridley but did "their own thing". Mr Standen never saw Mr Morris discussing their jobs with Ms Maguire.

56. Mr Standen said that on 16 March 2011 he was grinding rust off the hoppers so that they could paint them and put new mesh on them. He said the mesh was rusted and needed to be replaced.

57. Mr Morris had been working in the office during the day and at about lunch time came out and told Mr Standen to go with him to get some supplies.

58. After the trip to get supplies, Mr Morris started welding. Mr Standen had never seen Mr Morris or any other employee weld. Mr Morris used the welding gloves and rods he had just purchased but the welding helmet was at Ridley. Mr Morris told Mr Standen that he had sweaty hands – he kept taking the gloves off because of it. It was hot and the sun was coming in through the side of the shed.

59. Mr Standen was handing welding rods to Mr Morris as he required them. Mr Morris was sitting on the mesh he was welding on top of the hopper with his legs dangling down into the hopper. Mr Standen handed him a rod, looked away for less than a minute and when he looked back saw that Mr Morris had been electrocuted. He ran to turn off the power and raised the alarm with Ms Maguire and Mr Andrews. Ms Maguire called the ambulance and Mr Standen performed CPR on Mr Morris.

Wayne Andrews

60. Mr Andrews was employed as the storeman at Ridley. He said that his work was constant both in the production and maintenance seasons as he was

responsible for filling orders for the product manufactured by Ridley but also other product that was ordered in and distributed by Ridley to customers.

61. He said that on 16 March 2011 he, Mr Standen, Mr Morris and Ms Maguire were employed at Ridley. He said that Ms Maguire was the acting site manager at that time.

62. On the afternoon of 16 March 2011 Mr Andrews was told by Mr Standen that there had been an accident and he went over to the shed where he saw Mr Morris sitting on a hopper with his right arm leaning against a metal pole.

63. Mr Andrews had not seen Mr Morris welding previously. He said that the welder had been at the plant since Ridley had taken over from the previous owner which was in about October 2005. He had seen welding performed by other Ridley workers on a couple of occasions. The welder was kept in the workshop area and there were gloves and rods kept in a cabinet in the workshop.

64. Mr Andrews said that the mesh on the hoppers was a relatively new addition and had been installed one to two years previously. He said that the product which came into contact with the hoppers contained a lot of salt and was very corrosive.

Michelle Maguire

65. Ms Maguire gave evidence that she was the acting site manager at Ridley in March 2011. She produced a number of diagrams and maps demonstrating the site layout including the production shed and the offices.

66. Ms Maguire commenced employment with Ridley in February 2006. She was employed as the administration officer and her duties included book-keeping, answering phones, front desk reception, serving customers, taking orders and organising the filling of orders as well as other general administrative tasks.

67. Mark Lavers was the site manager until he left the company about six months prior to Mr Morris' death. Mr Lavers was in charge of maintenance during the off season and would allocate tasks.

68. When Mr Lavers left Ms Maguire was appointed as acting site manager. Despite her new role Ms Maguire was provided with no induction, no training and she continued to undertake her previous role as administration officer.

69. Ms Maguire had no supervisory role in relation to the other employees and had no input into the tasks that they would perform. She had no knowledge of the plant and machinery. As the only person in the office she was obliged to remain there throughout the day so that she could service the front desk if required. She did not go out to the production shed and did not know what was occurring out there.

70. Ms Maguire had no knowledge of Mr Morris' or Mr Standen's qualifications or what work they should be doing.

71. Ms Maguire stated that Mr Drayton had been the Production Supervisor prior to his transfer to the Wacol plant. At that time Mr Morris was promoted to Production Supervisor, however, he was supervised by Mr Lavers. When Mr

Lavers left Mr Drayton took over the role of supervising Mr Morris but carried it out from Wacol.

72. Mr Morris discussed the maintenance work that was to be carried out with Mr Drayton who gave him advice. Mr Drayton had flown up to Townsville to organise the maintenance schedule with Mr Morris. Mr Drayton and Mr Morris spoke frequently about the maintenance work – they were, "always talking on the phone".

73. Ms Maguire did not know that Mr Morris was intending to perform welding or that he was welding on 16 March 2011 but stated that had she known she would not have done anything about it as she would have assumed that it was within the scope of his responsibilities as she had no knowledge of his training or qualifications.

74. The welding machine used by Mr Morris was destroyed after his death and there has not been a welding machine on site at Ridley since then.

Jeffrey Drayton

75. After he was identified by the evidence of Ms Maguire as a person who may be able to provide relevant information to the inquest, representatives agreed to obtain a statement from Mr Drayton.

76. Mr Drayton said that in June 2008 when Mr Morris commenced work at Ridley, he was the Production Supervisor at the Townsville premises. He left there to move to the Wacol operation at the end of the production season in October 2009. It was decided that Mr Morris would take over the role of Production Supervisor.

77. At that time Mark Lavers was the site manager. During the month before he left, Mr Drayton provided training to Mr Morris. Mr Drayton said that after Mr Lavers left he was always available to provide advice to Mr Morris via phone and email.

78. Mr Drayton travelled to Townville in March 2011 to assist Mr Morris with preparing a maintenance schedule of tasks to be undertaken in the following months. He says that he did not know that Mr Morris intended to replace the mesh and that if Mr Morris told him that he intended to weld he would have told him to wait until Mr Drayton visited so that they could decide whether the job should be contracted out.

79. Mr Drayton said that he had welded at Ridley using the manual metal arc welder and a small MIG welder that was on site but the evidence was that he was qualified to do so having been trained in it as part of his Cert III automotive qualification.

Clint Hodges

80. Mr Hodges gave evidence as to the testing of the equipment carried out by the ESO. He said that there was some damage on the cables of the welder and there was no safety switch on the three phase outlet to which the welder was attached but those factors did not affect the outcome. The welder was operational and the output was within the voltage limit set out in AS1674.2 for Category B and C environments.

81. Mr Hodges provided his hypothesis as to how Mr Morris came to be electrocuted. He said that whilst replacing a welding rod there was contact made between the rod and Mr Morris' body – either his hand or his torso – and he then became part of the welding circuit. As he was sitting on the workpiece at the time the resistance was very low and the fact that he was perspiring resulted in low body impedance.

82. Mr Hodges opined that a voltage reduction device could have reduced the risk of electrocution for Mr Morris.

83. Mr Hodges agreed with the proposition, put to him by Mr Walters, that perspiration would cause moisture to build up within the clothes and gloves of a welder and that if a rod came into contact with damp clothing it could be sufficiently conductive to complete the circuit. Further, if a welding rod was to come into contact with moisture, it is possible for the rod to become conductive.

The Submissions

84. The parties were given an opportunity to make submissions. I invited the parties to provide submissions as to the making of a recommendation that AS1674.2 be amended to mandate that VRD be fitted on all metal arc welding machines used in Category B and C environments.

85. All parties submitted that they agreed with that recommendation but on the basis that the wording be changed to reflect that "hazard reducing devices" be mandated rather than the more specific, "voltage reducing device". Hazard reducing devices may encompass VRD but also other devices which have the result of reducing the risk of electrocution such as hand-piece trigger switches.

86. Mr Miles and Mr Major made no further submissions.

87. Mr Walters submitted that the evidence did not justify referring the matter to WH&S under s. 48 of the *Coroners Act 2003* in relation to Ridley as it was clear that nobody at Ridley knew that Mr Morris was welding or intended to weld, that there was a system in place whereby welding jobs were contracted out and that Mr Morris was adequately trained to carry out his duties as a Production Supervisor.

88. Mr Walters submitted that the absence of an operational safety switch on the power board to which the welding machine was connected did not affect the outcome for Mr Morris and I agree with that submission.

Findings on the Issue

Findings of Fact

89. It seems clear that Mr Morris came to be electrocuted according to the facts found by the WH&S investigation and the findings by the Electrical Safety Office. That is, that he was welding mesh onto the hopper, he was sitting on the mesh on the hopper and had the earth cable attached to it and as he

changed the welding rod he completed the circuit and received a fatal electric shock.

90. An issue to be explored at the inquest was whether Ridley, by its employees, knew or should have known that Mr Morris was or was likely to undertake welding and whether it should have taken precautions against that possibility.

91. In regard to that issue I accept the evidence of Ms Maguire and Mr Drayton and find that neither of them knew that Mr Morris intended to weld or that he was welding on 16 March 2011.

92. What has emerged from the evidence provided at this inquest and which was not apparent from the investigations carried out by WH&S is that Mr Morris was largely unsupervised and decisions about the work to be carried out were left to his discretion.

93. The inference to be drawn from the evidence obtained under the investigation was that Ms Maguire was carrying out the duties of the site manager; however, this was not the case. Ms Maguire was site manager in name only. She continued to carry out the duties of administration officer. Mr Lavers had not been replaced when he left that position vacant. Mr Drayton obviously attempted to provide guidance and supervision to Mr Morris but his evidence was that sometimes three weeks passed between their communications and he was not aware of what Mr Morris was doing on a day to day basis.

Findings in relation to Electrocution

94. The welder was operational and did not possess any faults that made it unsafe and it complied with the relevant standards for welding in a Category B environment (see discussion of standards, below), however, despite this, Mr Morris received a fatal electric shock. The evidence revealed that this was because of a number of factors:

95. Mr Morris was sitting on the metal hopper (the workpiece) resulting in a relatively short path of resistance which increased the current he received from the handpiece;

96. The conditions on the day were humid and would have caused Mr Morris to perspire thereby increasing the conductivity between the hand piece and his body;

97. The current therefore received by Mr Morris was sufficient to cause a fatal electric shock.

Safety Issues

Australian Standards

98. Standards Australia is an independent, not for profit, non government standards body. In consultation with government, business, industry, community, academia and consumers, Standards Australia develops internationally aligned Australian Standards (AS) and related publications to help ensure the safety, reliability and performance of a range of products, services and systems.

99. On their own, AS have no legal status and there is no requirement for compliance by manufacturers, consumers or the public. However, they provide a useful bench mark and they are also often called up in State and Commonwealth legislation. When this happens, these AS become mandatory and can be subject to the scrutiny of the courts.

100. The relevant AS is 1674.2-2007, "Safety in welding and allied processes, Part 2: Electrical" the scope of which is stated as:

> *This Standard sets out safety requirements for arc welding and allied processes, to reduce the possibility of electric shock and minimize associated hazards. It includes requirements for cable connections for alternating and direct current power sources, as well as requirements for hazard-reducing devices and other ancillary equipment. It also describes practices and safeguards that should be adopted by welders and provides examples of situations that present an increased risk of electric shock.*

101. Section 2.1 provides that parts of welding circuits, including workpieces and current return paths, have to be considered electrically live. Consequently, welders shall follow the precautions and requirements in this Section, to minimize the risk of current passing through their body.

102. Clause 1.3.19 provides that "shall" indicates that a statement is mandatory and clause 1.3.20 that "should" indicates a recommendation.

103. Section 2.2 provides that before welding commences, the work area shall be assessed and the welding environment classified for risk of electric shock in accordance with Clause 1.3.6.

104. Clause 1.3.6 defines the welding environments:

Category A environment

An environment where –

a) the risk of an electric shock or electrocution by arc welding is low; normal work practice is used; and,

b) it is not possible for a welder or any other worker to be in contact with the workpiece, in the event of being in contact with a live part of the welding circuit.

Category B environment

An environment where there is a significant risk of the welder contacting the workpiece or other parts of the welding circuit.

NOTE: Such an environment may be found where the ambient temperature is less than 32°C and –

freedom from movement is restricted, so that an operator is forced to perform welding in a cramped position (e.g. kneeling, sitting, lying), with physical contact with conductive parts (e.g. the workpiece); or

there is a high risk of accidental or unavoidable contact by the operator with conductive elements, which may or may not be in a confined space as defined in AS/NZ 2865.

Category C environment

An environment where the risk of an electric shock or electrocution by arc welding is greatly increased due to low body impedance of the welder and a significant risk of the welder contacting the workpiece or other parts of the welding circuit.

NOTE: Low body impedance is likely in the presence of water, moisture or heat, particularly where the ambient temperature is above 32°C. In wet, moist, or hot locations, humidity or perspiration considerably reduces the skin resistance of human bodies and the insulating properties of personal protective equipment accessories and clothing.

105. Clause 1.3.10 defines "Hazard-reducing device (HRD)" as a device designed to reduce the hazard of electric shocks from a welding circuit.

106. Clause 1.3.22 defines "Voltage-reducing device (VRD)" as a type of hazard-reducing device (either internally or externally fitted to a welding power source) that is designed to automatically reduce the open-circuit voltage to a safer level.

107. Section 2.2 sets out the control measures that are to be utilised in each of the categories.

108. Section 2.3.2. provides that in a Category B environment the open-circuit voltage 68V a.c. and, if necessary, a hazard reduction device should be fitted to comply with that requirement.

109. Section 2.3.3 provides that, in a Category C environment, the voltage between the electrode holder and the workpiece while an arc is not present shall not exceed 35V a.c. and notes that for manual metal arc welding the power source may require a hazard reducing device.

110. Mr Morris was welding in circumstances that brought the environment within either Category B or Category C. Although the open circuit voltage of the welding machine he was using was found to be less than the maximum permitted for Category B he received a fatal electric shock. This was due to the fact that he was in contact with the workpiece and he was perspiring.

111. Had Mr Morris employed the control measures set out in AS1674.2, such as insulating himself from the workpiece, he would not have received a fatal electric shock.

Findings required by s45

112. 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. As a result of considering all of the material contained in the exhibits, I am able to make the following findings in relation to the other aspects.

Identity of the deceased	Daniel Paul Morris
How he died	Mr Morris died from electrocution. He was electrocuted when he came into contact with the electrode in the welder he was using whilst he was in contact with the workpiece and perspiring.
Place of death	The Townsville Hospital, Townsville, QLD, 4810 AUSTRALIA
Date of death	23 March 2011
Cause of death	Electrocution

Comments and recommendations

113. Section 46 of the *Coroners Act 2003* provides that a coroner may comment on anything connected with a death that relates to public health or safety, the administration of justice or ways to prevent deaths from happening in similar circumstances in the future.

114. The sad and untimely death of Mr Morris highlights the dangers of electricity particularly when using welding machines and the care that should be taken to comply with the control measures as set out in AS1674.2. It also highlights the added dangers that a welder is exposed to when he or she is welding in humid conditions.

115. AS1674.2 sets out the precautions which should be taken when welding in each of the defined categories and I acknowledge that, had those control measures been implemented in this case it is likely that Mr Morris would not have been electrocuted.

116. However, it is likely that due to apathy, ignorance or accident, some welders will inevitably come into contact with workpieces whilst operating welding machines and, when they do, they will be at real risk of receiving a fatal electric shock unless the welding machine they are using is fitted with a voltage reduction device. This is so regardless of which category of environment they are welding in. Further, welders who work in humid climates are at even greater risk of electrocution.

117. A Category B environment is an inherently dangerous situation – by definition a welder in a Category B environment is at significant risk of contacting the workpiece or other parts of the welding circuit. It seems evident that in tropical conditions and, even in other climates, persons wearing heavy protective clothing and undertaking physical work in what are, largely, un-airconditioned buildings, are likely to be perspiring.

118. Although that may put them in a Category C environment it is more than possible that workers would not turn their minds to considering the ambient temperature, re-assessing their level of perspiration at times during the day

and changing their equipment so that they are using a welding machine fitted with a hazard-reducing device. Employers who expect workers to weld in a Category B environment should be expected to provide a workplace which is as safe as possible.

119. I recommend that Australian Standards consider amending Australian Standard 1674.2 to provide that the fitting of hazard-reducing devices (HRD) to welding power sources used for manual metal arc welding is mandatory when welding is carried out in Category B and C environments.

120. I further recommend that WH&S amend the fact sheets published on its website to reflect the recommendation that HRD be fitted to all manual metal-arc welding machines which are used in humid conditions and/or Category B or C environments.

121. Considering that this inquest has heard new evidence in relation to Ms Maguire's role as site manager and Mr Drayton's role in supervising Mr Morris which was not taken into account when WH&S officers decided not to commence any prosecutions, I recommend that WH&S now re-open the investigation into whether Ridley should be prosecuted under the *Work Health and Safety Act*.

I close the inquest.

Jane Bentley
Coroner
TOWNSVILLE
15 August 2013