IN THE CORONERS COURT
AT ALEXANDRA

CSU-2010-DUN-000447

UNDER **THE CORONERS ACT 2006**

AND

IN THE MATTER OF An inquest into the death of **ROGER ALLAN STEEL**

Date of Hearing: 26 October 2012

Date of Provisional Findings: 29 November 2012

Date for Submissions: 14 December 2012

Date of Finding: 23 January 2013

Appearances: Garth Gallaway and Aleisha Chadderton (for Delta)
Tim Cadogan (for David Mays)
Greg Stewart (for Karyn Steel)

FINDINGS OF CORONER D O CRERAR

Introduction

[1] Roger Steel died on 9 December 2010 at Millers Flat when the power pole on which he was working fell from an insecure footing placement. Roger Steel, who had tied himself to the pole with a safety harness, received an electrical shock and burns then multiple severe injuries, including fatal head injuries, when the pole hit the ground.

[2] Delta Utility Services Limited (Delta), the employer of Roger Steel, has been convicted of offences under The Health and Safety in Employment Act 1992, because the company did not take all practicable steps to ensure that Roger Steel was not exposed to the hazard of an unstable power pole in his place of work..

[3] An issue remained relating to the fact that Roger Steel sustained moderately severe electrical burns, which may or may not have been fatal, at about the time of his death. How and why Roger Steel received these burns required further investigation to ensure that Roger Steel and/or his employer had complied with the regulatory environment, and safe working practice governing the work undertaken. It was necessary also for consideration to be given as to whether or not the death was preventable and whether appropriate

recommendations, to avoid a repetition of the circumstances of the death of Roger Steel, could be made.

[4] An Inquest is held to establish that a person has died, the causes of the death and the circumstances of the death. An Inquest is not a trial. A Coroner has no function to determine civil, criminal or disciplinary liability. The text of s 57 Coroners Act 2006 (the Act) is included in the Appendix to this Finding.

Evidence

[5] Evidence was presented to the Inquest hearing by witnesses:

(a) Robert Bruce Taylor, an engineer employed by Delta to review the obligations of the company in respect of the Health and Safety in Employment Act 1992

(b) David John Mays of Alexandra, a linesman who was employed by Delta at the date of death of Roger Steel

(c) Michael McAndrew Crabbe, of Roxburgh, a network officer for Delta

(d) Brian Craig Smith of Alexandra, the Health and Safety manager for Delta

(e) Dr Alexander George Dempster, a consultant pathologist of Dunedin

(f) Melvin John Pedersen, a consulting electrical engineer of Christchurch

(g) Clive Ian McGregor, a Health and Safety Inspectorate Team Leader employed by the Ministry of Business, Innovation and Employment (MOBIE) who summarised the circumstances of the death of Roger Steel insofar as MOBIE was concerned and who outlined the events of the prosecution which followed.

(h) Robyn Jean Murdoch of Cromwell, the Distribution Designer for Delta.

(i) Tony Spence Davis of Alexandra, a former workmate of Roger Steel.

(j) Senior Constable Jape Wanoa of the Roxburgh Police who provided evidence to satisfy the obligations of a Coroner pursuant to s 57 and produced exhibits which are scheduled in the Appendix to this Finding.

[6] Delta manages distribution lines for the distribution network Aurora Energy Limited (Aurora). Aurora has an obligation to conduct a safety assessment of 20 percent of its lines every year to ensure that each line is inspected for safety at least every five years.

[7] As part of a 'condition assessment' of a 240 volt distribution line on the Millennium Track, Robyn Murdoch created an inspection report which identified that six out of eleven poles on this line required replacement. Robyn Murdoch issued a 'work instruction' and a Delta contract gang was tasked to perform the replacements.

[8] Pole 54520 was erected, by a Delta work gang lead by David Mays, in the footing of the pole which it replaced. The relocation of the pole and it's placement was recognised later to be non-conforming and the deficiencies were reported by Michael Crabbe to Robyn Murdoch. In addition to the insecure footing, there were safety issues created by the non-replacement of a stay wire and a further issue, (relating to the fact that the wires on the line, of which pole 54520 was a part, had a potential problem with clearance between it and a higher voltage line (the Talla Burn line) in the vicinity), was identified. Work to address the safety issues was specified in a 'job card'

[9] Roger Steel, whilst looking for work, on the 6th December 2010, took a 'work order' from the desk of a colleague and travelled to Millers Flat to attend to some of the necessary work on pole 54520. He returned to Pole 54520 on 9 December 2010 to complete the work.

[10] A reconstruction of the events, from the physical evidence available, indicates that Roger Steel, on arriving at the worksite, took the appropriate security precautions by opening the fuse carrier and isolating the 240 volt (LV) line. Roger Steel then placed a ladder against the pole 54520, ascended the ladder and attached himself to it by means of his safety harness. Whilst he was working in that position, the pole fell. Because the pole was situated at the edge of a bank, it has been calculated that the total fall sustained was 22 to 24 metres. Roger Steel received instantaneously lethal head and other injuries caused by the impact.

[11] All of those engineers investigating the incident postulated scenarios as to how the pole collapsed and how (because the pole was isolated from a supply of electricity) the electrical burns, received by Roger Steel at about the time of his death, could have been caused.

[12] Dr Dempster, assisted by Dr M Strauss, conducted the postmortem examination. The pathologists commented:

> The deceased suffered non-survivable injuries following the fall of the power pole. There was a significant laceration of the thoracic aorta that was associated with 500

> mil of fluid blood which was present in the left plural cavity. There was extensive bruising of the scalp beneath the area of a laceration and a basal fracture of the skull extending from left to right across the anterior cranial fossa on the right side.
>
> The presence of electrical burns in the skin indicate that at some point the deceased came into contact with live wires, with electrical burns and sites indicating the likelihood of passage of an electrical current across the chest. The relatively small amount of blood in the plural cavity suggests that a cardiac arrest occurred at the time of or shortly after the injury was received. Histological slides of the electrical burns have been reviewed by another senior pathologist who agreed that they were electrical burns.

[13] Each of Brian Smith, Clive McGregor and Bob Taylor, in their separate Reports provided prior to the Inquest Hearing postulated possible causes of, or contributors to, the electrical burns. Melvin Pedersen, who was requested to provide an overview, provided his conclusions.

[14] After the conclusion of the Inquest Hearing, I requested Melvin Pedersen, who, of course, appeared for the Coroner as an expert witness, to summarise, in more concise terms than could I, the chain of events leading to the death of, and the electrical burns suffered by, Roger Steel.

[15] The synopsis, ('Sequence of Events'), of Melvin Pedersen and the plan (adapted from that originally created by Roger Taylor when presenting his evidence and drawn on the whiteboard adjacent to the witness box, such plan identifying all relevant features) drawn by Melvin Pederson is included with this Finding.

[16] This Finding will be circulated to all parties to the Inquest Hearing on a 'provisional' basis in the hope that all will endorse the content of the 'Sequence of Events' which will provide some comfort to the family of Roger Steel.

Issues/Reasons

[17] As stated in the Introduction, it is the role of a Coroner to determine the fact that a person has died, the person's identity, where and when the person died, the causes of the death and the circumstances of the death.

[18] Roger Steel died on the Millennium Track near Millers Flat on 9 December 2010. The exact time of death cannot be reliably calculated but was between the time he was last seen in Alexandra at approximately 9.15-9.45 am on the day of his death and the time his body was discovered at approximately 2.00 pm.

[19] The cause of the death of Roger Steel was the medical cause identified at autopsy:

> Multiple severe injuries including a severe **head** injury with a compound comminuted skull fractures, diffuse cerebral injury and laceration of the thoracic aorta.

[20] It was Dr Dempster, who identified the electrical burns at autopsy, who caused a concentration of my enquiry upon this aspect of the circumstances of the death. Dr Dempster in cross-examination at the Inquest Hearing opined that the electrical burns were indicative of Roger Steel having received an electrical shock of some severity which may or may not have been debilitating, and which may possibly have been fatal were it not for the crush injuries received within seconds of the electric shock. The circumstances of the death are referred to in the evidence and are appropriately summarised in the Melvin Pedersen, 'Sequence of Events'.

[21] In addition to the issues of identifying the five obligations imposed by s 57(2) of the Act, I am required to address s 57(3) of the Act and make recommendations. In making recommendations, I am assisted also by the enquiries by both Delta and by the Department of Labour.

[22] The 'hazard identification' procedure adopted in this case by Delta and by its employees proved unsuitable. There was sufficient information available, at all times, to show that pole 54520 was unsafe in its placement. It is not the role of the Coroner to attribute responsibility for any individual whose duty it was to advise of the 'unsafeness'. The systems adopted by Delta to record and to pass on this information were unsatisfactory and these require to be enhanced. I am generally satisfied however, from the acknowledgements received at the Inquest Hearing from Delta senior staff who attended, that the appropriate lessons have been learnt and that there is unlikely to be a repeat of a similar set of circumstances which lead to the tragedy.

[23] A particular observation must be made in relation to the tagging of a pole. As I understand the evidence, if a wooden pole is deemed unsafe, it has a red tag affixed to it. The affixing of a red tag to a concrete pole must technically present a greater difficulty but I am sure that with appropriate thought and technology this issue can be addressed and solved. Dangerous poles must be identified as being a danger. The submission to the Provisional Finding by Delta advises that the company now complies with the industry standards in this regard and achieves "red-tagging" by 'strapping methods'.

[24] Another enhancement to work practice and procedure, which this tragedy has identified, is the "man alone" policy. Roger Steel has been variously described as being a self-starter and a self-motivator who, although with some difficulty, ought to have been able to complete the tasks on Pole 54520 which he set himself. If another Delta employee had been accompanying Roger Steel, no doubt the physical task would have been made easier.

[25] A difficulty which I observe is the fact that with an employee working alone, there is no opportunity to 'peer review' a thought process or a work practice. Roger Steel had a mindset which did not include his consideration of the fact that the pole placement may have been unsafe. Another work mate, another set of eyes, another few years of experience may have created, in discussion, an awareness of the hazard and the adoption of a work practice to avoid the outcome which resulted.

In it's submission to the Provisional Finding, Delta disagreed with this observation. The phrase "another few years of experience" was not intended to convey the impression that Roger Steel did not have appropriate experience. There would have been great value in another Delta employee, with experience even if less experience than Roger Steel, being on site at the time. Airline pilots work in pairs not because either has insufficient ability or experience but to ensure that decisions are joint and peer reviewed

[26] Roger Steel made a decision without benefit of any other discussion or input and his death has been the result. The initial report of Bob Taylor was suggestive of the fact that Roger Steel ought to have identified the hazards at the site of pole 54520 and ceased work when he observed the hazards. If he had been accompanied by another work mate, a joint observation may have made a difference.

[27] The process by which the 'work orders' or 'job cards' were uplifted by Roger Steel, which prompted his attendance at Millers Flat, needs also to be reviewed by Delta.

Recommendations

[28] Although I am satisfied that the tragic death of Roger Steel has resulted in an appraisal by Delta of its work practices, it is appropriate for me to comment, with approval, the enhancements to it's work practices which have been made and which are identified in the evidence of Brian Smith.

[29] I recommend that specific reference be made by Delta to the future practice of "sign-off" for a project identified in a work instruction sheet

> "project has been completed, checked for defects and been left a safe condition".

[30] The "working alone" policy applying at the time of the death of Roger Steel has also been addressed. I recommend that this continue. As I have stated, the policy must go beyond merely having two workers on site, one to give aid or to call for help for another in the event of a mishap. Two minds are better than one. Another worker may have identified the hazard the pole presented when such hazard was not noticed by Roger Steel.

[31] I recommend that Delta adopt"red tag" identification for all suspect poles as I have outlined in my previous comments.

[32] In addition to the safety sign-off referred to in para 29, Delta must adopt a system whereby 'job sheets' are not created without the instruction specifically identifying hazards which may exist and of which the employee uplifting the 'job sheet' may be unaware.

[33] I recommend that a copy of this Finding be forwarded to the Electrical Engineers Association (EEA) for wider distribution through the electrical supply industry. I ask that all those engineers who have assisted me with my enquiry, as part of their role within the Association, draw the attention of their colleagues to the circumstances of the death of Roger Steel and to the enhancements identified which could, if acted upon, reduce the chances of further deaths in similar circumstances.

Finding

[34] I find that Roger Allan Steel of Alexandra, a lineman, died at the Millennium Track near Millers Flat on 9 December 2010 when, whilst he was working on a power pole which had been erected with an insecure footing, the pole fell from its placement and carried Roger Steel, who was attached to it with a safety harness, down a bank with a total fall height of approximately 20 metres. The cause of his death was multiple severe injuries including a severe head injury with a compound comminuted skull fractures, diffuse cerebral injury and laceration of the thoracic aorta. I find that the injuries received were immediately and inevitably lethal.

[35] Whilst he was attached to the falling pole, the power lines from the pole became livened due to their close proximity to higher voltage lines which were adjacent to them. Roger Steel received electrical burns to the left neck and right arm which may or may not (from the evidence of Dr Dempster) have been debilitating and/or fatal. The cause of these burns has been identified to my satisfaction.

Conclusion

[36] I extend to Mrs Karyn Steel and to her family my condolences for their loss and my thanks for their search for the truth which the Inquest evidence has provided.

[37] I thank the police for providing evidence for my enquiry and I thank the several electrical engineers approached to assist with reports on their opinion as to the cause of the death of Roger Steel.

[38] This Finding was issued on a provisional basis to allow submission on the identified facts and my summary of them. I wished to ensure that, as far as is possible, the technical description of the incident was reached by consensus and I am now satisfied that the conclusions are correct to the standard of proof required of a Coroner.

Signed at Dunedin on this 23rd day of January 2013.

Coroner D O Crerar

ADDENDA

Submissions to the Provisional Finding were received from Delta and from MOBIE. Some of the submissions received have been accepted and have resulted in enhancements to the text. All other submissions have been considered but no alteration has been deemed to be necessary or appropriate.
MOBIE request that comment be added advising that "the addition of 'mandatory earths' (as described in the Electrical Industry Guidelines, Guide to Work on De-Energised Distribution Overhead Lines), to the low voltage line at each side of the work area, would have mitigated or at least considerably lowered the risk of any voltage rise in the conductors being worked upon". MOBIE also suggest that EEA "reinforce to their practitioners the necessity of ensuring poles to be climbed are identified as safe before they are ascended, and that staff should ensure that isolated conductors are earthed before work on them commences".

APPENDIX

57 Purposes of inquiries

(1) A coroner opens and conducts an inquiry (including any related inquest) for the 3 purposes stated in this section, and not to determine civil, criminal, or disciplinary liability.

(2) The first purpose is to establish, so far as possible,—

(a) that a person has died; and

(b) the person's identity; and

(c) when and where the person died; and

(d) the causes of the death; and

(e) the circumstances of the death.

(3) The second purpose is to make specified recommendations or comments (as defined in section 9) that, in the coroner's opinion, may, if drawn to public attention, reduce the chances of the occurrence of other deaths in circumstances similar to those in which the death occurred.

(4) The third purpose is to determine whether the public interest would be served by the death being investigated by other investigating authorities in the performance or exercise of their functions, powers, or duties, and to refer the death to them if satisfied that the public interest would be served by their investigating it in the performance or exercise of their functions, powers, or duties.

This finding is to be read in conjunction with the Coroner's Certificate of Final Finding issued pursuant to s 94 of the Act.

Sequence Of Events

1. 240 Volt supply to overhead line isolated by pulling of fuse connection at transformer.
2. Roger Steel climbs ladder of pole 54520 and disconnects phase conductor from cross arm insulator. Feeds conductor out on a rope tether.
3. Pole 54520 with Roger Steel attached falls connecting with tethered phase conductor on the way down.
4. Phase conductor strains under the load of falling pole 54520, pulling adjacent pole 54522 towards it.
5. Pole 54522 moves 50mm at the base (300mm approx. at the top) towards pole 54520, and pulls up the catenary between pole 54522 at the transformer pole. The pulling up of the catenary brings the cable into close proximity with the 33kV line above.
6. A voltage is induced into the 240V line from its proximity to the 33kV line, and this voltage causes a current to pass through Roger Steels body which is now in contact with the line as pole 54520 continues to fall.
7. The 240 Volt line breaks between pole 54520 and pole 54522, and pole 54522, 'springs' back to its vertical position.

Note.

a. Voltage induced on 240V line must have been less than 300 Volts as the 240V electric fence unit connected further on onto the 240 line was undamaged.

Sketch of approx. locations of lines & poles for 33kV and 240 Volt lines
Millennium Track, Millars Flat