

IN THE MATTER OF:

2009 VICTORIAN BUSHFIRES

ROYAL COMMISSION

SUBMISSIONS - BEECHWORTH FIRE

(Persons represented by Maddens Lawyers & Nevin Lenne & Gross)

1. **Summary**

- 1.1 The Beechworth fire started when a falling tree dislodged a conductor on the 3-phase 22kV "Myrt7" feeder and caused it to contact Pole 170. The uninsulated conductor arced against the steel-reinforced concrete pole. Sparks ejected from the arc point then ignited dry vegetation at the base of the pole, starting the fire.¹ The electricity assets involved were part of the SPA network.
- 1.2 Two primary observations are made. First, the tree should not have been there. By SPA's internal standards it was a Hazard 4 tree requiring immediate removal, by at least the time of the last annual line clearance inspection on 29 May 2008.² The inspection system broke down at three points: an unqualified person had done the inspection; his work had not been checked; and in fact he failed to detect the tree.³
- 1.3 Second, the potential for falling trees to cause arc events was an obvious risk at this section of the Myrt7 feeder. An engineering solution was available: instead of bare conductors, individual spans along the feeder could (and should) have been replaced with insulated

¹ Exhibit 239 - Statement of Shawyer (WIT.3020.002.0001) [70]

² Exhibit 243 - Statement of Peters, Annexure 7 (WIT.5101.001.0225) at 0230, 0231; Exhibit 243 - Statement of Peters (WIT.5101.001.0001) [215]; Peters T7203:28-T7204:11

³ Peters T7149:12 - T7149:20 and T7200:9 - T7200:15

conductor or insulated aerial bundled cable.⁴ If the cable had been insulated the risk of arcing in the event of tree or pole-contact would have been negligible.⁵

2. Immediate cause

- 2.1 The tree was located approximately 35 metres to the south-east of Pole 170 (the **tree**) and 14 metres east from the eventual point of contact with the conductor. Prior to its collapse the tree was approximately 26.5 meters tall.⁶
- 2.2 The tree had comprised a trunk which bifurcated into two scaffold branches, pointing roughly north-north-east (**northern limb**) and south-west (**southern limb**) respectively.⁷
- 2.3 The northern limb had died at least 18 months prior to February 2009, according to growth indicators.⁸ The death was associated with a splitting of the trunk down to ground level.⁹ Colin Bertuch, Arborist with the Alpine Shire Council expressed the view that the northern limb, although dead, had remained attached and aloft. By May 2008 there would have been discolouration (browning) of its foliage.¹⁰
- 2.4 The southern side of the tree (trunk and southern limb) was alive and growing but overall the tree, following the death of the northern side, was in the process of “active failure” and that it was “inevitable that the two halves would separate in the near future”.¹¹ There is no doubt that as at May 2008 it was a “Hazard 4” tree according to the SPA tree assessment guidelines.¹²
- 2.5 On 7 February 2009 the wind was blowing from the north-west.¹³ There was a complete failure of the southern half of the tree: the southern branch and the southern side of the

⁴ Peters T7191:9 - T7191:24

⁵ Shawyer T7074:4- T7074:9

⁶ Exhibit 239 - Statement of Shawyer (WIT.3020.002.0001) [25]

⁷ Exhibit 242 – Statement of Bertuch, Tree Report – Buckland Gap Road – Beechworth (VPO.001.026.0230) at 0241; Bertuch T7136:17 - T7136:22

⁸ Bertuch T7146:16 - T7146:22; Exhibit 242 – Statement of Bertuch, Tree Report – Buckland Gap Road – Beechworth (VPO.001.026.0230) at 0235 and 0241; Bertuch T7136:17 - T7136:22

⁹ Bertuch T7136:18 - T7136:19

¹⁰ Bertuch T7142:19- T7142:29

¹¹ Exhibit 242 – Statement of Bertuch, Tree Report – Buckland Gap Road – Beechworth (VPO.001.026.0230) at 0237; Bertuch T7141:7-T7141:17

¹² Exhibit 243 - Statement of Peters, Annexure 7 (WIT.5101.001.0225) at 0231

¹³ Exhibit 557 – Bureau of Meteorology, Meteorological Aspects of the Murrungee Fire on 7 February 2009

trunk fell away from the northern half (causing the southern main trunk root to lever out of the ground).¹⁴ The crown fell across the eastern conductor on the Myrt7 feeder about 35 metres south of Pole 170.¹⁵ The weight of the tree caused the ceramic insulators on the east side (“outside” relative to the road) of Poles 169 and 170 to fail.¹⁶

- 2.6 The Pole 169-170 span was effectively a north-south span. But from Pole 170 to 171 the conductor angled slightly to the north-north-west.¹⁷ When the tree dislodged the east-side conductor, the angle meant the conductor sprang in and scraped down the east-side of Pole 170. (The evidence indicates that in any event the tree snagged on it and pushed it against the pole: the scouring of the concrete caused by the conductor assembly as it fell indicates that there was unusual weight on the conductor.)¹⁸
- 2.7 The Myrt7 feeder was supported by an automatic circuit recloser (“ACR”) and a high-speed trip breaker. The high-speed trip was disabled. The ACR was not suppressed, by reason that the feeder was also supported by a Neutral Earth Resister device (“NER”) and SPA's policy was not to suppress ACRs on feeders supported by NERs.¹⁹ The consequence was that the ACR reconnected the circuit on three occasions after the initial fault incident was detected by it.²⁰ On each reclose, sufficient current was delivered to Pole 170 to sustain an arc.²¹
- 2.8 Pitting on Pole 170, particularly at its base, is firm evidence of the blasting-off of material as a result of arcing between the conductor and the reinforcing mesh within the pole. The blast (“spalling”) marks show the conductor came very close to, and probably contacted the ground.²²

(BOM.901.0131) at 0143; Lawlor T6916:14-T6916:19

¹⁴ Exhibit 242 – Statement of Bertuch, Tree Report – Buckland Gap Road – Beechworth (VPO.001.026.0230) at 0235 and 0239

¹⁵ Exhibit 239 – Statement of Shawyer (WIT.3020.002.0001) [25]

¹⁶ Exhibit 239 – Statement of Shawyer (WIT.3020.002.0001) [57] [59]

¹⁷ Exhibit 239 – Statement of Shawyer (WIT.3020.002.0001) [25]

¹⁸ Exhibit 239 – Statement of Shawyer (WIT.3020.002.0001) [41] [58]; Exhibit 234 – Statement of McDonnell (SUMM.044.002.3536_R) at 3537_R; McDonnell T6986:15–T6987:6

¹⁹ Exhibit 237 - Statement of Lane (WIT.5100.001.0001) [69]; Exhibit 238 - through Lane ESV.001.001.0742 at 0748; Lane 7026:04 - T7026:24

²⁰ Exhibit 237 - Statement of Lane (WIT.5100.001.0001) [193]; Lane T7027:11 - T7027:21

²¹ Lane T7027:22 - T7028:2 and T7026:25 - T7026:31

²² Shawyer T7062:13 - T7062:26 and T7063:2 - T7063:16

- 2.9 The reinforcing mesh within Pole 170 is carbon steel. The conductor was aluminium. Given the differential melting temperatures²³ the more likely source of sparks (luminous metallic particles) is the aluminium conductor. Aluminium continues to burn after it is ejected from an arc and is strongly associated with the ignition of grass fires.²⁴ The absence of recovered aluminium particles is unsurprising for that reason. Moreover, so far as an attempt at recovery was made it was done using magnets. Aluminium is not magnetic.²⁵
- 2.10 The first eyewitness to the fire was Ms Johns.²⁶ She was driving north along the Buckland Gap Road and therefore was able to see both the base of Pole 170 and the slope from the base down to the area of the tree. She was clear that the initial area of fire was at the top of the slope around the base of the pole, not down the slope or near the tree.²⁷ None of the other contemporaneous witnesses had as good a view of the whole area, and those who attended after the fire was under way acknowledged they had no particular cause to check to see precisely where it might have started.²⁸
- 2.11 Professor Blackburn gave evidence that arcing was much more likely to occur between the conductor and the pole, rather than the tree and the conductor.²⁹
- 2.12 The physical evidence therefore indicates that the tree fell onto the conductor, snagged, and dragged the still energised conductor down the eastern side of Pole 170 until it rested against or very near it at ground level. The ACR reclosed and sent fault current through the conductor as it fell and, since it fell quickly, probably also after it came to rest. Burning aluminium particles ignited the dry grass, and fire ensued.³⁰

3. Upstream contributing factor – hazard tree identification failure

²³ Sweeting T11382:4 - T11382: 15 referring to Assoc Prof A.D. Stokes *"Fire Ignition by Electrically Produced Incandescent Particles"*, Appendix E to Australian Standard AS1033.1-1990

²⁴ Blackburn T9897:26 - T9898:6 and T9898:13 - T9898:16; Exhibit 311 - Tse & Fernandez Pello *"On the Flight Paths of Metal Particles and Embers generated by Power Lines in High Winds - A Potential Source of Wild Fires"* (WIT.7003.001.0015)

²⁵ Kelleher T7125:17 - T7126:9

²⁶ Exhibit 230 - Statement of Johns (BCHM.001.001.0001)

²⁷ Johns T6939:28 -T6940:2

²⁸ Collins T6953:1 - T6953:10

²⁹ Exhibit 437 - Statement of Blackburn (EXP.008.001.0001) [4] This disposes of suggestions by SPA at T7145:26 that the arc may have occurred between the conductor and the tree

³⁰ Exhibit 239 - Statement of Shawyer (WIT.3020.002.0001) [70]; Shawyer T7062:25 - T7062:26 and 7063:4 - T7063:5

- 3.1 The tree had not been within the “clearance zone” covered by the Electric Line Clearance Regulations.³¹ It was however within the “hazard space” covered by SPA's internal Hazard Tree Assessment Guidelines.³² The evidence of Bertuch makes plain that by no later than May 2008 the tree would have met the Hazard 4 criteria and according to SPA's internal procedures required immediate removal.³³
- 3.2 SPA had engaged Eagle Travel Tower Services (“ETTS”) to conduct line clearance inspections for the Myrt7 feeder. SPA required vegetation inspectors to obtain certain internal qualifications (albeit delivered by external trainers). The training session delivered to assessors on 14 April 2008 involved a 30 minute session addressing the assessment of hazardous trees. No other formal training was provided to assessors in 2008. This brief session is manifestly inadequate considering the magnitude of the risk hazardous trees present.³⁴
- 3.3 The span between Poles 169 and 170 had been inspected on 4 and 21 June 2007, 6 September 2007 and 29 May 2008.³⁵ At least the September 2007 and May 2008 inspections occurred after the death of the northern half of the tree. The May 2008 inspection was carried out by Mr S. Willis.³⁶
- 3.4 Mr Willis was not called to give evidence.
- 3.5 Available evidence however shows that Mr Willis had not obtained the necessary qualifying score during his training.³⁷ Despite SPA's policy only to use qualified inspectors, Willis instead got “about two days” work in company with a qualified inspector (Bridgland) and was then allowed to conduct inspections as if he had qualified.³⁸ Further, the work was not the subject of any additional checking beyond the usual random audits.

³¹ Exhibit 225 - Supplementary Annexure 1 - Electricity Safety (Electric Line Clearance) Regulations 2005 (Vic) (SPN.600.001.2280)

³² Exhibit 243 - Statement of Peters, Annexure 7 (WIT.5101.001.0225) at 0230, 0231, 0232; Peters T7182:4 - T7182:14

³³ Exhibit 243 - Statement of Peters, Annexure 7 (WIT.5101.001.0225) at 0230, 0231, 0232

³⁴ Exhibit 243 - Statement of Peters, Annexure 29 - SP AusNet Vegetation & Easement Management - Assessment & Cutting Training Session - April 2008 - Agenda; Peters T7198.19 - T7199.1

³⁵ Exhibit 243 - Statement of Peters (WIT.5101.001.0001) [215]

³⁶ Exhibit 243 - Statement of Peters (WIT.5101.001.0001) [215]

³⁷ Peters T7200.9 - T7200.15 and T7149.12 - T7149.20

³⁸ Peters T7201.11 - T7201.20

3.6 SPA did not follow its own protocol in permitting Mr Willis to conduct unsupervised vegetation inspections, and plainly its Hazard Tree Assessment Guidelines were not properly implemented at least in May 2008 and probably (given Bertuch's evidence as to the likely death date of the northern section of the tree) also in September 2007.

4. Upstream contributing factor - absence of engineering protections

4.1 Counsel Assisting have criticised SPA's policy of not suppressing ACRs,³⁹ even on extreme fire risk days, if the particular feeder is subject to a NER device.⁴⁰ Those criticisms are entirely warranted and require no further comment here.

4.2 The evidence shows, however, that whatever view is taken of the ACR policy, there were and are other engineering solutions which avoid the "community impact" issues associated with a reversal of the ACR policy.⁴¹ Trees near conductors are dangerous⁴² but it does not follow that the only solution is to remove all trees. There are two alternatives. The first is to *move the conductors*, either underground or by diverting around hazard areas. The fact that such work might be expensive is not to the point: the cost of a bushfire is vastly greater, on any measure. But if undergrounding or diversion are not possible, or on a proper assessment of risk the next alternative is a technically acceptable solution, then the other option is to *insulate* the conductor.⁴³

4.3 This does not equate to a proposal that all conductors in the State, or even that all spans on a particular line, be insulated. The uncontroverted evidence is that it is possible to insulate particular spans,⁴⁴ and further that insulation would have reduced the risk of conductor-pole arcing to a "negligible" risk.⁴⁵ In areas like the approach to Beechworth where the sheer number (and amenity) of trees in the "hazard space"⁴⁶ make clear-felling inappropriate, then at least the conductor should be insulated.

³⁹ Exhibit 237 - Statement of Lane (WIT.5100.001.0001_R) [69]; see also Exhibit 238 - SP AusNet Bushfire Mitigation Plan (ESV.001.001.0744) at 0478; Lane T7013:29 - T7014:8

⁴⁰ Lane T7012:12 - T7012:23

⁴¹ Sawyer T7066:13 - T7066:17

⁴² Breheny T11925:27 - T11925:29

⁴³ Exhibit 243 - Statement of Peters (WIT.5101.001.0479); Annexure 24 at 0491; Annexure 40 (WIT.5101.001.0666) at 0672; Annexure 42 (WIT.5101.001.0687) at 0687

⁴⁴ Sawyer T7073:28 - T7074:4

⁴⁵ Sawyer T7074:9

⁴⁶ Peters T7182:5 - T7182:8

4.4 The obviousness of the need for insulated conductors along at least parts of the Myrt7 feeder is accentuated when it is remembered that in the area where the Beechworth fire started:

- (a) the poles are *steel*-reinforced concrete;⁴⁷
- (b) there are frequent changes of direction from span to span;⁴⁸
- (c) current would continue to flow after any initial fault notification, because the ACR would rarely if ever be suppressed.⁴⁹

Thus not only was there an obvious risk of tree-fall across the live conductors, there was also an obvious risk that a detached conductor would spring or be pushed against a potential conductive structure – a pole – and would arc.⁵⁰

4.5 Plainly the circumstances of the Myrt7 feeder in the vicinity of Pole 170 required that the conductor either be undergrounded or insulated. Undergrounding would have eliminated⁵¹, and insulation would have reduced to negligible⁵², the risk which in fact eventuated and caused the Beechworth fire. Given the loss of life and community property which resulted, the economic cost of insulation was insignificant.

5. Recommendations

5.1 The vegetation management program within SP Ausnet is deficient in several respects:

- (a) the training given to vegetation inspectors is perfunctory and inadequate. More emphasis must be given to the importance of checking for and accurately identifying risks in the hazard space. The incorporation of “hazard space” in the regulations commencing after June 2010 is appropriate but in substance it merely replicates the distribution businesses’ existing internal protocols.⁵³ The protocols present well on paper but it is clear that the inspectors attending the Buckland Gap area had not been adequately trained in their implementation. The evidence regarding inspectors’ training in the identification of problems in the *hazard* space shows that very little attention has historically been given to that topic. Given that the significance of the

⁴⁷ Exhibit 237 - Statement of Lane (WIT.5100.001.0001_R) [186]

⁴⁸ Exhibit 237 - Statement of Lane (WIT.5100.001.0001_R) [186]

⁴⁹ Lane T7013:29 - T7014:5

⁵⁰ Exhibit 437 - TR Blackburn “*Electrical Aspects of the Bushfires at Pomborneit and Beechworth*” (EXP.008.001.0001) at 0016

⁵¹ Peters T7195:27 - T7195:28

⁵² Sawyer T7074:9

⁵³ Sawyer T7076:29 - T7077:3

risk is acknowledged in the company literature, its cursory treatment in the actual training programs is inadequate.⁵⁴ More detailed arborial training of vegetation inspectors is readily available and could be introduced at low cost;⁵⁵

- (b) SP Ausnet's internal controls failed to prevent unqualified staff being permitted to conduct unsupervised and unaudited inspections of spans in high risk areas. The supplementary training given to Mr Willis after he failed to qualify in his training was not adequate and it is inexcusable that his subsequent inspection work was not closely supervised until he did obtain the required qualifications.
- 5.2 We also propose a recommendation that both the linesman engaged in the construction, repair or maintenance of electricity infrastructure, and the line inspection personnel (ie., the category engaged through, for example, UAM) should be given the same training as the vegetation clearance inspectors. This would mean that any attendance at a site, by either category of personnel, would produce an opportunity for informed assessments to be made as to whether a vegetation risk exists and requires attention.⁵⁶
- 5.3 It is recognised, nonetheless, that for some spans even a close and competent hazard space inspection would not sufficiently reduce the risk that vegetable matter would come into contact with live conductors. We do *not* propose that the appropriate response then is to remove all the trees in the area. Rather, for those spans the primary response must be to move or redesign the *conductors*.
- 5.4 The first task in this respect must be the collection of sufficient data to identify spans at high risk of vegetation impact. Appropriately targeted work can then be undertaken – as a matter of urgency – the underground or at least insulate *those spans*. Those measures will significantly reduce the risk that shortcomings in line clearance inspections will have the consequences which occurred at Beechworth in February 2009.
- 5.5 Last, the evidence regarding SP Ausnet's existing systems emphasises the bifurcation of the business's line-repair work from its vegetation-management work. It appears that line-

⁵⁴ Peters T7198:19 - T7199:5 referring to Statement of Peters (WIT.5101.001.0568) Annexure 29 - *SP AusNet Vegetation & Easement Management - Assessment & Cutting Training Session* - April 2008

⁵⁵ Peters T7199:28 - T7200:8

⁵⁶ Peters T7199:28 - T7200:5

inspectors⁵⁷ and its vegetation inspectors⁵⁸ both use sophisticated modern equipment with internet-based data transmission capacities. The hand-held PDA devices are a major innovation and should be developed to their full potential, to make it easier for all field personnel – whether linesmen, line inspectors (like UAM’s personnel) or vegetation inspectors (like ETTS’ personnel) – quickly to create a record of the type, location and date of anything which occurs to any of them as a potential issue.⁵⁹ Something as simple as an alert that a potential issue has been noticed at a precise GPS-confirmed location, without any specifics, could be uploaded to a centralised database and then downloaded to a *vegetation* inspector’s worksheet or PDA for the purposes of the next annual vegetation inspection. A quick one-touch alert function would add nothing to the workload or time commitments of field personnel, but the simple fact that someone thought to make the notation could be used to prompt the designated *vegetation* inspectors to take particular care at the next scheduled line-clearance inspection at that location. The opportunities afforded by hand-held electronic devices with GPS capability and internet access are extensive. The evidence suggests that the existing devices require either detailed inputs, or else none at all. Similar or linked devices should be provided to all field personnel and the interface should allow the quick recording of alerts concerning vegetation issues.

⁵⁷Exhibit 523 - Statement of Ying - (WIT.7526.002.0001) [23]; Exhibit 523 - Statement of Leech- (WIT.7507.002.0001) [26]

⁵⁸ Exhibit 243 - Statement of Peters (WIT.5101.001.0001)[158] - [160]

⁵⁹ Exhibit 243 - Statement of Peters (WIT.5101.001.0001)[28]