2009 Victorian Bushfires Royal Commission

Submissions cover sheet

Post your submission with this cover sheet to: **Submissions 2009 Victorian Bushfires Royal Commission**
GPO Box 4358, Melbourne VIC 3001

Email your submission with this cover sheet to: enquiries@royalcommission.vic.gov.au

Title: Mr	**First Name:** Michael	**Surname:** Gunter
Organisation represented by your submission *(if applicable)*:		
Email address:	mickgg@suburbia.com.au	
Postal address:	14/37 Haines Street, North Melbourne, VIC, 3051	
Telephone:	0423 970 195 or 9018 9102	

Main topics addressed by your submission *(please tick)*:

☒ Causes and circumstances of the bushfires	☐ Essential services, including water and power
☒ Policy, preparation and planning of governments, emergency services	☐ Buildings
☐ Preparation and planning by communities and households	☐ Insurance
☐ Response to the bushfires	☒ Other (please state): SPAusnet Counsel

Please list any towns or communities that are discussed in detail in your submission:

Please provide a general description of what materials you are providing as part of your submission
(eg. Letter; document; DVD, photos. Please do not send originals):

- accompanying attachment entitled GUNTER_Michael_supplementary_submission_1.pdf

Confidentiality

The Commission will consider all requests for confidentiality. Should you wish for your submission, or parts of your submission, to be treated as confidential, please clearly state the reason in the space provided below. If you require more room, please attach a separate page and provide together with your submission.

Should the Commission consider the request for confidentiality not to be appropriate you will be provided with an opportunity to withdraw your submission or re-submit it in a form suitable for publication.

Please select one of the following options

☒ I acknowledge that my submission will be treated as a public document and may be published, quoted or summarised by the Commission.

OR

☐ I request that my submission, or parts of my submission, be treated as confidential, and not published quoted or summarised by the Commission, for the reasons stated here:

Acknowledgements

I understand that:

- *I can be contacted by the Royal Commission in relation to my submission.*
- *Anonymous submissions will not be accepted.*
- *The name and town or suburb of each submitter will be identified as part of every published submission. Other contact details will be removed before publishing.*

- *The Commission will not publish submissions if it believes that the submission material is or could be defamatory, offensive, contravenes anti-discrimination or anti-vilification legislation or is outside the scope of the Commission's terms of reference.*

Signature:

Or if sending electronically please confirm your acknowledgment by ticking this box ☒ **Date** 10th September 2009

North Melbourne
VIC, 3051
Thursday 10th September 2009

Chairman, the Hon. Bernard Teague AO
Commissioner Ronald McLeod AM
Commissioner Susan Pascoe AM

Dear Commissioners,

Re: Mr Beach's Submission from the Bar Table, Day 49.

I regret to inform you that there are significant issues of technical accuracy in relation to some of what Mr Beach said today when speaking to the material contained in documents prefixed "SPN.011.003."

Although you and I are on an equal footing "on paper" with respect to electrical qualifications, and therefore merely laypersons at the mercy of qualified experts, I claim a degree of technical proficiency regarding electric power transfer by virtue of owning and successfully operating and maintaining the ***Breamlea Wind Generator*** from December 1995 to June 2003, on the Victorian coast south of Geelong. This followed on from a keen practical hobbyist's interest in all matters electrical and electronic from my early teen years.

Here I shall paste a transcript of what Mr Beach said shortly before the luncheon adjournment, and add comments in the form of footnotes:

There's one [diagram] which showed power flow in terms of a water pipe, where you might think of voltage as water pressure, current as the volume of water passing through as a function of time, and resistance in terms of the diameter of the water pipe. Anyway that was a diagram that was SPN.011.003.0002.

You need an electromotive force - that's provided by the potential difference which we all know as voltage, and the current flow as depicted by that diagram is the flow of water. Now in terms of circuits, can we just go back to the previous chart which sets out for you Ohm's Law. To have a current flow you need a completed circuit and you need to have resistance in the circuit to enable current to flow [1] *. Ohm's Law is quite important, it's important for this reason: that if a fault occurs along a line at a particular voltage what normally happens is that the current will take the path of least resistance. If the voltage stays the same though, and "R" the resistance reduces, what you then get is a current increase or a current surge and that's what you'll see in some material: "I" [the current] will go up and that's explained by the operation of Ohm's Law.*

Now in terms of the structure of the industry, there is a chart at SPN.011.003.0004 which shows generation at the top left corner. [2] *The transmission lines are usually rated at 500,000 [or] 330,000 or 250,000 volts. They come into terminal stations, which is where the beginning of each*

1 What actually allows the current to flow is conductance, the inverse of resistance. Current flow is therefore inversely proportional to the resistance in a circuit.

2 I have reason to believe this diagram may have been plagiarized from an article I wrote in ***ReNew*** magazine in 1999. If the image is my artistic (!) work, or an obvious copy of it, I draw your attention to the fact that SPAusnet is using the image without my permission, and if the diagram is clealy a copy of my work, I ask respectfully that it be redacted out of all SPN. materials before the Commission. My original artwork is attached at Annexure 1. Had I been in your Hearing Room today, I would already have been able to ascertain this for myself.

distribution network is, and what happens is that in those terminal stations, those voltage get transformed or dropped down to 66,000 volts and you have those lines which is known as subtransmission systems coming into zone substations, and there is a zone substation for example at Myrtleford. And what happens at a zone substation is that the voltage is transformed and dropped down to 22,000 volts, 22 kV, and those 22kV lines are what are known as feeders. You might have ten feeders coming out of a particular zone substation. Here the relevant feeder that we are dealing with next week is the Myrtleford No.7 feeder which is a 22kV line that passes along Buckland Gap Road.

Now off these feeders you'll have different things. You might have directly a distribution substation, which is a fancy expression for a transformer on a pole, which may take the 22,000 volts and transform it right down to 240 volts, or you might have the voltage from 22kV transformed down to 12.7kV and if you go to the chart [SPN.]011.003.0021 you will see in that chart an explanation of dropping a three-phase 22 kilovolt line down to a 12.7 kilovolt line. That's in that bunch of charts at [SPN.011.003].0021 - if you go through to that - keep going - should be able to bring that up in a minute - and off a feeder, that's right - off a 22 kilovolt feeder, which is the second diagram, you'll see how you can bring that down to 12.7 kilovolts. You'll see in the bottom position that off your three-phase 22 kilovolt line, it drops down to a single phase 22 kilovolt line, which is then dropped down, at the start of what is known as a single wire earth return to 12.7 kilovolts, and that is obviously relevant to the Kilmore East issue.

Can I just explain three-phase, single-phase and SWER. You can have what's known as direct current or alternating current. For direct current you have current in one direction, but because you need a complete circuit, you have to have a return current, and so the line shown on that diagram where you have single phase, is a single current passing down one line and then returning on the other line, so it's two conductors but a single phase. [3]

When you get to the SWER system, you can have a single current [4] *passing along the line and you don't need a return conductor because what's used as the return conductor is the Earth itself, and hence that's where you get the expression SWER from: which is single wire earth return, so then the current travels along one wire and then comes back to that pole where it starts, through the conductor which is the Earth itself. It refers to a SWER isolating transformer, which steps the voltage down from 22 kilovolts to 12.7 kilovolts. It's called an isolating transformer because it's a transformer which is isolating itself from the earth, because of course a single phase line is not connected to earth* [5] *, the SWER system is connected to earth because one of its conductors is the Earth itself. That's why you need to isolate that entire circuit, and hence you get the expression isolating transformer.*

Now the three phase line is a little bit trickier, because what's used on the three-phase line is alternating current [6] *, and that is where the current changes direction every 20 milli-seconds* [7] *and there is a diagram for that at [SPN.]011.003.0026. And so what you have is you have three conductors: conductor one - phase one, conductor two - phase two, conductor three - phase three,*

---

3 This paragraph is seriously in error, as the phases present in an AC circuit have nothing whatsoever to do with direct current. Mr Beach should be invited to have this paragraph struck from the record, but more importantly SPAusnet must ensure that the SPN.011.003.XXXX documentation to which he was speaking does not contain the same basic technical gobbledigook, which in my mind would raise serious issues about the technical competence of their organization.

4 He seems to mean its a single phase alternating current circuit.

5 Of course a single phase line ***may*** be connected to earth, because both sides of the isolating transformer are single phase circuits. On one side of the transformer, the circuit is earthed, on the other side the circuit is not earthed.

6 Again, same mistake: the phases of AC circuits are nothing at all to do with direct current (DC) circuits.

7 Minor quibble: a full cycle of 50 Hertz AC takes 20 milliseconds, and involves TWO changes of current direction, so the current changes, and your fluorescent lights flicker, 100 times every second, once for each half-cycle. Competent power engineers SHOULD KNOW THIS STUFF!!!

and you have each of the currents on each line oscillating and changing its direction in the way indicated, but all of the phase currents should add up to zero [8]. So you know when there's a fault on a three phase or three conductor line, if all the phases don't add up to zero. Alternating current is used because apparently that's a more efficient way to deliver power over long distances, and it's also easier to transform that current than direct current. But the type of 22kV feeder that you'll be looking at next week is a three conductor line, with alternating current, with the phases shown in the diagram, and the sort of pole and set of conductors that you'll be looking at, there's a diagram for that at SPN.011.003.0029.

Whilst we have it ..uh.. yes, you can see there the three conductors, the cross arms and the concrete pole. As I say it's three phase alternating current. The two-phase, sorry the single phase with the two conductors, there's a diagram for that at SPN.011.003.0027, and that can also come off a 22kV feeder, and then the SWER type power line, there's a photograph of that at SPN.011.003.0028.

Can I make one other reference and that is to protective devices?

On lines if there is a current surge and you need to protect equipment, there are various types of protective mechanisms. There's a fuse that if it operates needs to be manually reset and a photograph of that is at SPN.011.003.0017 - that's right, that's a fuse type. And then there are what is known as different types of protective mechanisms that you'll hear evidence about next week known as Automatic Circuit Reclosers, and if you go to the next picture, you'll see that, and what that enables is a bit more sophistication in dealing with faults, so that if you have a fault downstream, say a possum or a bird has caused a short circuit, it may be only a transient fault. What will happen with the automatic recloser is that the circuit will open, breaking the current flow obviously, it will wait several seconds, hopefully the fault will clear and then it will reclose. So it's designed to keep supply going and to deal with transient faults. But that cycle of opening and then reclosing, if you have a fault that is continuing, the recloser will open and then reclose over a certain period, a certain number of times, and then if the fault is still there it will open permanently. So it's designed to improve reliablity of supply by allowing the transient fault to clear, but you'll hear about the operation of the ACR in relation to the Myrtleford 7 feeder insofar as it applied to the incident at Buckland Gap Road. That's probably the only set of useful photos I need to take you to.

One is left with the erroneous impression that single phase means direct current, and this is plain wrong. Counsel assisiting, or their research officers, should perhaps get independent retired electrical engineers to review all SPAusnet's documentation currently submitted, and ask for much clearer and error-free accounts of what really happens in the Victorian power grid.

If Mr Beach's seeming reluctance to speak to the document was because he could not understand it, and had no prior knowledge of AC electric power, it may be that he could not reasonably have been expected to understand it because the document itself is wrong and incomprehensible. This is what I urge the Commission to discover, and if the document reflects technical imcompetence, please factor this into findings as to the fitness of that organization to hold a distribution licence.

All the discussions above have assumed that AC circuits have negligible ***inductance*** and negligible

8 It is true that if one were to put a current meter (clamp meter) around three live bundled insulated cables transferring AC power, the meter would read zero if the three currents were perfectly balanced in respect to both magnitude and phase. In the practical everyday application of three phase power distribution, the three phases are rarely if ever in perfect balance, so it is not generally true to say or imply that a non-zero reading indicates serious fault. The statement adds little of use here, to a basic understanding of AC power transfer. Perhaps the Commission could seek the views of a retired electric power engineer to see if there is a better way of explaining fault detection strategies, as this may be very relevant to the determination of causes of the Electricity Fires.

capacitance. Using this simplification, the compounding factors related to the real-world behaviour of AC circuits exhibiting ***impedance*** can be completely ignored for our purposes, and the term "resistance" becomes a rough substitute for the correct term "impedance". This is in stark contrast to days like Black Saturday, when the skilled optimization of **"reactive power"** and **"ancillary market services"** on the National Grid are absolutely critical to system stability and security, so again the technical competence of the grid operators in avoiding unnecessary tripping of loads is critical to not starting bushfires.

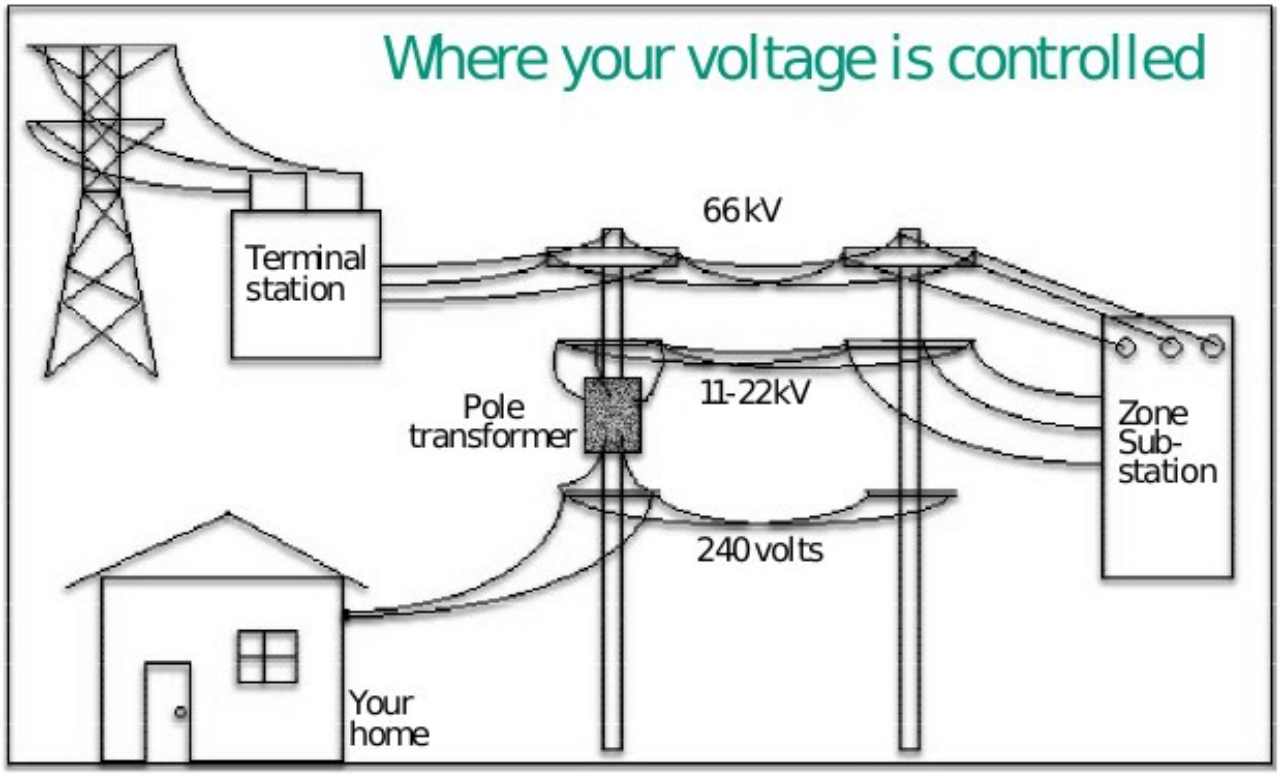
On the other hand, the unbridled free market growth of air-conditioning load as a way of cooling city and country folk alike, may make the retailers and regulated monopolists gleeful, but woefully compounds both the risk of local hot spots in the electric power grid, and of accelerated climate change due to all the resultant CO2 emissions.

Whether or not my diagram of the electric power grid has been plagiarized, I respectfully request that the SPN.011.003.XXXX document series be made publicly available, so that a wider variety of technical experts may review it for other errors or plagiarisms which may be present, but as yet not revealed by being read into the transcript. Perhaps the document series SPN.600.001.XXXX should also be linked on your web site for public review and comment.

Yours faithfully,

Michael Gunter
Webmaster/author of http://www.voltscommissar.net/

Annexure 1.



Voltage is controlled at two points in the transmission system: the terminal substation and zone substation. The pole transformer converts voltages down to 240 volts.

This image is my own art work, as published in *ReNew* magazine, Issue 68 July 1999 on page 48. The article to which it relates, about supply voltage as a tool for the extraction of monopoly rent, is available online at http://www.voltscommissar.net/docs/voltage.pdf